THE UNIVERSITY *of* EDINBURGH

Curriculum Innovation from a Complex Ecological Perspective: A Developmental Physical Education Case Study

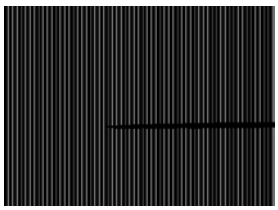
Mike Jess

Doctor of Philosophy

The University of Edinburgh

2011

I, Mike Jess, declare that this thesis, submitted in fulfilment of the requirements for the award of Doctor of Philosophy, in the School of Education, University of Edinburgh, is wholly my own work unless otherwise referenced or acknowledged. The document has not been submitted for the qualification at any other academic institution.

Signed 

Acknowledgements

A twenty four year journey and a fourteen year PhD. Too many stories and too many people to thank, but it's certainly been interesting.

Special thanks to:

My supervisory team, Pamela Munn, John Sproule and Matt Atencio: supportive and stimulating..

The Developmental PE Group (DPEG): it's your story as much as it's mine.

My family for all their support and love: couldn't have done it without you.

What's next?

Abstract

Curriculum Innovation from a Complex Ecological Perspective: A Developmental Physical Education Case Study

With recent developments in Scottish education characterised by less prescriptive curriculum guidance, educators, and teachers in particular, are being presented with the opportunity to become more active participants in the curriculum innovation process (Scottish Executive, 2004). This thesis argues, however, that a more participatory curriculum innovation approach contrasts with the centrally-driven top-down curriculum projects that have held currency over the last 30 years; as such, the experiences of most teachers, and their managers, have not helped build the capacity to cope with and influence the curriculum innovation process. Following on, it is suggested there is an urgent need to develop curriculum innovation approaches that specifically set out to help educators construct these innovation-related capacities.

The thesis proposes that a more participatory curriculum innovation approach may be achieved by extending concepts from current educational 'change knowledge' (Fullan, 1993) to include key principles from complexity-oriented theories (Biesta, 2010; Morrison, 2010). A complex ecological approach (CEA) is presented in which curriculum innovation efforts are portrayed as complex, self organising, emergent, non-linear and ambiguously bounded phenomena influenced by the ongoing interaction of contextual factors and personal capacities. The applicability of this complex ecological approach is explored by means of a case study focused on my personal curriculum innovation efforts in primary physical education (PE) over a twenty-four year period from 1987-2011 in two countries: England and Scotland. I provide a detailed retrospective analysis of the 'Developmental Physical Education Project' (DPEP) to explore the extent to which the macro, meso and micro

contexts in which I worked and my personal capacities have influenced my curriculum innovation efforts over this twenty-four year period. In particular, the nature of my developmental PE innovation efforts, characterised as complex, self-organising, emergent, non-linear and ambiguously bounded is explored. Analysis reveals the important influence of different contextual factors on the nature of these innovation efforts, particularly the prevailing policy-making and policy-dissemination processes and the support of micro-level management. However, the most significant finding is the central role played by my personal capacities in shaping innovation efforts that, over time, are self-organising, emergent, ambiguously bounded and non-linear. In particular, the analysis highlights how six key capacities; reflection, inquiry, emotions, vision, knowledge and relationships, all played a key role in helping me cope with and influence the innovation process. Given these findings, the thesis concludes by proposing ways in which the CEA may help educators, and teachers in particular, better understand, negotiate and influence future curriculum innovation agendas.

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Chapter 1: An Introduction to the Developmental Physical Education Project

1.1 Introduction

Shortly after becoming a peripatetic primary physical education (PE) teacher in 1987 I made the career and life-changing decision to focus my efforts on designing and introducing a developmentally appropriate approach to early years PE (Gallahue, 1987). I was disillusioned with the traditional multi activity curriculum approach[1] that had dominated children's PE for many years. For the next 24 years, I have worked within this marginal curriculum area, negotiating my way through a series of highs and lows to gradually see the emergence of a developmental PE agenda in Scottish PE. Ironically, after working in England throughout the 1990s, where the multi-activity approach dominates, one week before presenting this thesis I was invited to a 'think-tank' charged with rewriting the Key Stage 1[2] PE curriculum along developmentally appropriate lines. After 24 years I am beginning to see some tangible progress. However, as will be discussed throughout the rest of this thesis, my story is not only about change in a marginal curriculum area, it is also about a change process offering an insight into the complexity of curriculum innovation: it is about educational change.

However, while educational change is a common term in the educational literature, its definition remains ambiguous. In a broad sense it refers to overall systemic change e.g. school buildings, zoning policies etc., while, in a narrower sense, it often

[1] The multi activity approach to PE is characterised by 'short units of activity (six to ten lessons), minimal opportunities for sustained instruction, little accountability for learning, weak or non-existent transfer of learning across lessons, units and year levels (and), few policies to equalise participation between boys and girls (in co-ed) and high-low skilled players.' (Kirk, 2004 p.203)

[2] Key Stage 1 is broadly equivalent of the infant age range in Scotland i.e. 4-7 years.

refers to curriculum change. As such, educational change, curriculum development and curriculum innovation are often used interchangeably in the literature to mean similar things. Acknowledging these similarities, and in an effort to align with the concepts of emergence and uncertainty associated with the complexity-oriented approaches used in this study, the term 'curriculum innovation' will be used throughout this thesis to refer to the efforts to bring about curriculum change. However, because of its regular use by many authors in this context (e.g. Fullan, 2009), educational change will also be used when appropriate.

1.2 Educational Change and Curriculum Innovation

Since the late 1970s the notion of change has been a topic of concern for the education profession. The thirty years following the 2nd world war had been a positive time with teachers having a considerable degree of autonomy in curriculum decisions. Innovation projects were generally instigated and driven from an internal, bottom-up perspective (Goodson, 2001). Top-down government intervention was limited and teachers' "collective confidence" was generally high (Rudduck, 1991). However, research investigating school effectiveness began to report schools having less impact than anticipated (e.g. Colemen, Campbell, Hobson et al., 1966) with the result that confidence in the education profession gradually began to wane and governments increasingly took a more 'hands-on' approach to the curriculum (Whitty, 2002).

In the UK, where this thesis is set, a top-down, government-driven approach to education became particularly apparent in the 1980s and 1990s as the conservative then labour governments created an education system based on accountability and

performativity measures (DES, 1988[3]). In England, with a national curriculum introduced based on traditional curriculum subjects (Ball, 2008), national literacy and numeracy tests (Clark, 1987) were used to create league tables as a means of comparing schools and identify 'failing' schools (DfE, 1994). Local Management of Schools (LMS), based on business management models, was also introduced to ensure head teachers led their schools as businesses (Simkins, 2000). As the curriculum narrowed and leadership agendas focussed on the senior management within schools, the teachers' role in curriculum innovation diminished and they became increasingly perceived as 'technicians' (as opposed to autonomous professionals (Ball, 2001)). The 'collective confidence' of the post war period began to evaporate and frustration was soon to follow (Day, 1999).

In Scotland, the UK government's reforms were not embraced with the same fervour (Menter, 2005), with parents rejecting national testing (Pickard, 2003) and forcing the government to limit its aspirations (Munn, 1997). This performativity agenda, however, did manoeuvre a shift in the overall educational focus from personal development to economic and social productivity (Hartley, 1987). Scottish teachers were no more satisfied than their English counterparts, complaining of innovation overload and consistent accountability (Arnott & Menter, 2007). In a relatively short period of time, as government control increased, the educational landscape of the UK changed.

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[3] In England, the Department of Education and Science (DES) was created in 1964, renamed the Department for Education (DfE) in 1992 and again as Department for Education and Employment (DfEE) in 1995. In 2001, the DfEE became the Department for Education and Skills (DfES), in 2007 the Department for Children, Schools and Families (DfCSF) and in May 2010 returned to being the DfE.

This last decade, however, has seen the government begin to gradually loosen its control of education. In Scotland, following devolution in 1999, the McCrone agreement on teachers' conditions of service (Scottish Executive, 2000) placed the education profession 'on a firm footing by according values and status to teaching as a profession' (Humes, 2003, p 77). In England, with growing uneasiness about the impact of the top-down, centrally driven curriculum projects (Goodson, 2001), there was an acknowledgment that educational reform is much more complex than originally thought (Stoll, Fink & Earl, 2003). A consensus began to emerge that the relationship between the education profession and central government needed to change, and that teachers needed to regain some of the professional autonomy they had lost. Curriculum innovation projects, particularly in Scotland (Scottish Executive, 2004a), are gradually beginning to be instigated and developed in a bottom-up fashion from within the education profession (e.g. Wallace & Priestley, 2011).

From a personal perspective, my curriculum innovation efforts in primary PE have similarly been influenced by the changing focus of the political landscape. For most of the 24 years, PE, and primary PE in particular, have suffered from low status and marginal positioning on the curriculum (Green, 2000; Houlihan & Green, 2006). For example, in England during the 1990's the government's focus on literacy and numeracy narrowed children's learning experiences in schools to such an extent that primary PE almost disappeared from the curriculum (Speednet, 1999). In addition, with PE of limited interest to education policy makers (Houlihan & Green, 2006), the conservative government was able to push its traditional sport agenda (Evans, Penney & Bryant, 1993) promising to 'put competitive team games at the heart of

school life' (cited in Carney & Armstrong, 1996 p. 69). As a result, the PE National Curriculum focussed on a traditional multi-activity approach which privileged team games (DES, 1992). This was a period of considerable personal isolation as the developmental movement approach I was seeking to develop (Jess, 1990) was not only concentrated in a marginal curriculum area but was incompatible with the PE National Curriculum.

Although my initial return to Scotland in 1999 was no less depressing, between 2001 and 2004 PE emerged as a curriculum area of political interest (Scottish Executive, 2004b). With data from the Scottish Health Survey (Scottish Executive, 1998) revealing high levels of inactivity and obesity, a PE Review Group (PERG) was created and presented a new vision for PE in line with social justice and lifelong learning agendas (Scottish Executive, 2004b). As PE moved from the margins of education a series of recommendations set the context for a major revival in primary PE. Moves towards two hours of curriculum PE for all children and the commitment that 'every primary school in each primary cluster should have adequate access to support from a PE specialist' (p. 30) began to change the PE landscape. With significant financial commitment from the Scottish government, the Universities of Edinburgh and Glasgow were commissioned to create the first postgraduate masters-level certificates in primary PE for class teachers to develop a specialism in primary PE. In a country with 2,200 primary schools, almost 1,300 teachers will have enrolled on these programmes by March 2012. Consequently, after many years on the margins, recent developments in primary PE have created a context in which I have the opportunity to consolidate and extend my curriculum innovation efforts in developmental PE and to work closely with teachers in their

roles as curriculum innovators. On a wider scale, but and in a similar fashion, curriculum developments in Scotland are currently repositioning all members of the education profession in the role of curriculum innovator.

1.3 Contemporary Thinking on Educational Change

As the education profession begins to more actively re-engage with educational change agendas, there is a growing recognition of a need to develop a much better understanding of how to involve teachers in the curriculum innovation process (Hargreaves 2005). With thinking rooted in constructivist learning theory beginning to influence the nature of educational change (e.g. Piaget, 1970; Vygotsky, 1978), a literature base focussed on the 'change knowledge' (Fullan, 1993) that supports an active, interactive and authentic innovation process is emerging (Newmann, 1994). This 'change knowledge' has been defined as the *"understanding and insight about the process of change and the key drivers that make for successful change in practice"* (Fullan, 2004, p. 4) and revolves around a number of key components that help build the capacity to engage with the innovation process, e.g. personal vision, mastery, inquiry, reflection, emotions and collaboration (Fullan, 2004). 'Change knowledge', therefore, takes us away from the top-down innovation approaches that have seen curriculum presented as products (Van Hught, 1989) and transmitted to teachers in a linear, 'quick fix' manner (Albrecht & Engel, 2007). Fullan (2004), however, has noted, this lack of 'change knowledge' has been the *"fatal element in most educational change efforts"* (p.2).

Although 'change knowledge' offers a better understanding of the change process, a number of limitations have yet to be adequately addressed. While there is a tendency

for ‘change knowledge’ to be presented as a list of loosely connected concepts (Stoll, 1999), the main concern is that ‘change knowledge’ has primarily been focused on senior education managers (Hallinger, 2003) and often results in teachers being perceived as ‘change knowledge’ recipients (Day & Smethem, 2008). A consequence of this continued teacher marginalisation has been the persisting perception that the actual curriculum innovations that are central to any educational change process are externally developed. Many teachers do not see curriculum as a ‘work in progress’ evolving through a reshaping process in response to new knowledge, feedback and from the contexts. Critically, many teachers do not see curriculum innovation as their job and, as a result, have developed limited knowledge and understanding of how the curriculum innovation-making process evolves (Rogers, 1995). This point is particularly pertinent in the current Scottish education context in which the government has specifically set out to create a more participative approach to curriculum innovation (Scottish Executive, 2004a).

‘Change knowledge’ may have helped move the curriculum innovation debate forward but it still has some way to go before it impacts upon teachers’ practices. Subsequently, while it is important to consolidate the positive features, this thesis suggests there is an urgent need to reconsider ‘change knowledge’ from a more conceptually connected and participative perspective so that teachers will be able to play a more effective role in the curriculum innovation process.

1.4 The Possibilities of Complexity Theory

Following on, the thesis suggests that key tenets of complexity theory (Morrison, 2010) may be a useful way to reconfigure ‘change knowledge’ in a bottom up and

conceptually connected manner so that teachers can more easily engage in the innovation process. Complexity theory offers teachers and groups of teachers the opportunity to more easily access and engage with 'change knowledge' because, instead of creating general rules for the population at large, it '*seeks to formulate rules of interaction for the individual entities making up a system or population'* (Burnes, 2005 p. 79). Davis & Sumara (2001) highlight that although the 'health' of the collective is critical, complexity theory is not about privileging the group over individual as "*the qualities, capacities & character of the complex system is actually dependent on (but not determined by) the specific qualities and characteristics of its subsystem"* (p. 88). Complexity theory, therefore, offers the potential to consider curriculum innovation process from a more teacher-led bottom-up perspective. Further, complexity theory also offers a conceptual unity because it functions more as a set of complexity theories acting as an umbrella term to include principles and concepts from a range of theories that include chaos theory, dissipative structures theory, the theory of complex adaptive systems, dynamical systems, situated perspectives and ecological theory. Consequently, complexity theory offers both bottom-up and conceptually connected principles.

Aligned to these principles, complexity views change as a self-organising and emergent process, that differs markedly from the traditional modernist or behaviourist view that sees change as pre-programmed, linear and certain. The idea of self-organisation and emergence, however, does not mean 'anything goes', but a different way to look at order and unpredictability. This point is particularly important because complexity does not reject notions of structure and order, but views these concepts through a different self-organising and emergent lens. As

Biesta (2008) contends, complexity *'can help us to understand order, structure, regularity, causality and permanence differently'* but *'provides us with a different understanding of those aspects of the physical and social world that are or appear to be not complex'* (p. 1). A particular interest for complexity scholars is to explain how complex systems are able to balance, or harmonise (Davis & Sumara, 2006), the differences between uncertainty and unpredictability whilst, at the same time, being able to *'achieve their integrity and maintain it over time' (*Biesta, 2010, p. 5). While modernist approaches present a centrally-driven, linear approach focussed on predictable outcomes, complexity proposes that we need to develop a better understanding of the self-organisation process as the key to influencing change (Morrison, 2010). In particular, given the recent shift in educational change thinking, more attention needs to be directed to bottom-up, self-organising and interactive approaches that acknowledge outcomes as more unexpected and probabilistic (Biesta, 2010). While complex systems naturally self organise and may produce expected outcomes in certain situations, it is important to recognise that these outcomes will not appear with absolute certainty on every occasion and are unpredictable. Self-organisation is not pre-determined but probabilistic (Biesta, 2010)

1.5 Complex Ecological Approach (CEA) to Curriculum Innovation

Although complexity theory *'generated a certain amount of hype in the nineties'* (Cilliers, 2010 p. vii), because of its descriptive, as opposed to prescriptive, nature, its impact on practice remains limited (Morrison, 2010). By synthesising complexity principles with elements from ecological theory (Newell, 1986) and 'change knowledge', a Complex Ecological Approach (CEA) to curriculum

innovation is presented with the intention of helping teachers engage more effectively in the innovation process. While the complexity and ecological elements of the CEA help describe the curriculum innovation and the context in which the innovation is taking place, 'change knowledge' offers the personal capacities that help teachers apply the curriculum innovation. Consequently, the CEA is built around three integrating elements: the curriculum innovation efforts, the context and personal capacities (see Figure 1.1).

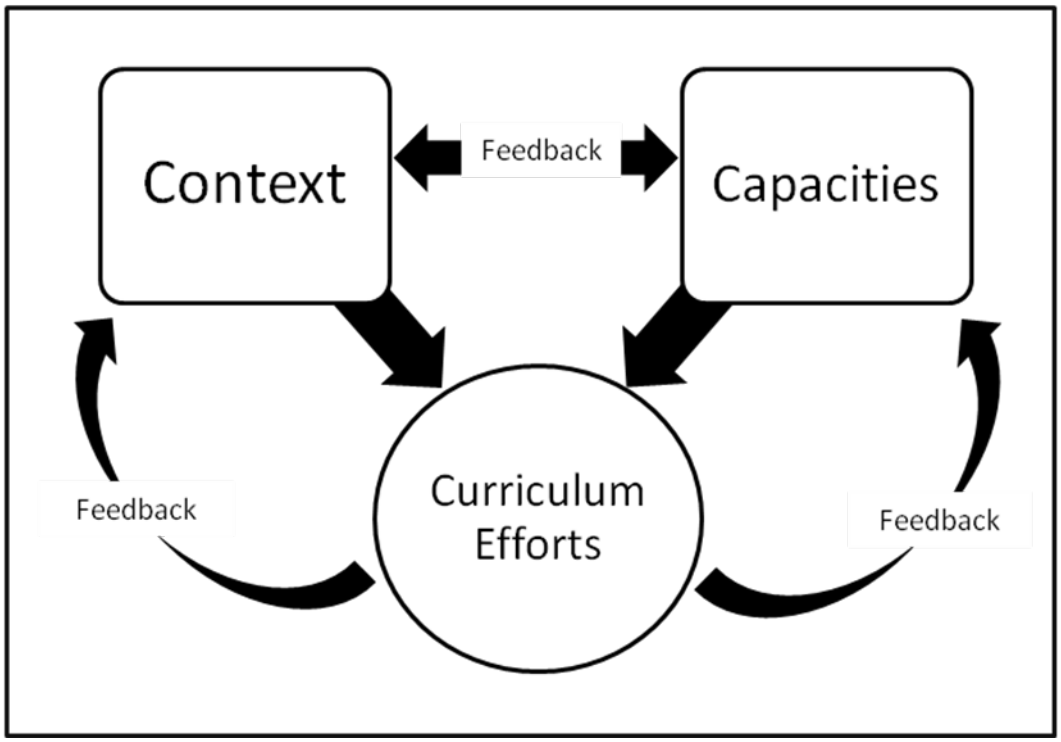

Figure 1.1 The Inter-related Components of the Complex Ecological Approach to Curriculum Innovation

From a CEA perspective, as will be discussed in more detail later, curriculum innovation is viewed as a self-organising and emergent process that leads to outcomes that are uncertain and unpredictable. Critically, in order to engage with

complex curriculum innovation from this self-organising and emergent perspective, the CEA proposes that teachers not only need to develop a detailed understanding of the context in which they are working, but also develop key capacities that will help them engage with learning experiences that are self-organising and uncertain.

While there are many ways to develop an understanding of the context in which innovation efforts take place, the CEA proposes an ecological approach because of its close conceptual similarity with complexity theory (Gibson, 1978/86). As such, developing an understanding of three interacting ecological contextual factors (Newell, 1986; Rogoff, 1990; Rovengo & Dolly, 2006) helps teachers frame the context in which the innovation efforts are being delivered. These three factors are,

The Individual: The children involved in the learning process

The Task: The activities being attempted (curriculum)

The Environment: the place in which the individuals are attempting the task

Finally, the CEA proposes that by categorising the 'change knowledge' elements discussed earlier as directional and integrating capacities, teachers will develop the ability to more effectively focus, guide and connect their curriculum innovation efforts. Consequently, the CEA proposes that, as a self-organising and emergent phenomenon, curriculum innovation is the result of an interaction between teachers' directional and integrating capacities along with their understanding of the ecological context into which their curriculum efforts are being introduced (see Figure 1.1). Developing teachers' directional and integrating capacities is proposed to be key to enhancing teachers' contribution to the future innovation agendas.

1.6 The Research and the Research Questions

Research Context and Questions

The overall aim of the thesis is to explore the potential of the complex ecological approach (CEA) to help teachers develop the capacity to cope with and influence the curriculum innovation process, particularly in the subject area of primary PE. The context for this exploration will be my personal curriculum innovation efforts in primary PE covering a 24 year period from 1987 to 2011, termed the Developmental Physical Education Project (DPEP). To explore the potential usefulness of the complex ecological approach, the thesis will investigate a number of questions as follows:

Question 1

How have the different contexts in which I have worked influenced my developmental PE innovation efforts over this 24 year period? In particular, what has been the impact of key macro, meso and micro ecological factors at the different nested levels of the education system?

Question 2

How have my evolving personal capacities influenced my developmental PE innovation efforts? Specifically,

a) How have my directional capacities influenced the focus and trajectory of my innovation efforts?

b) How have my integrating capacities influenced the connected nature of the innovation efforts?

Question 3

What evidence is there to support the proposal that the nature of my innovation efforts over the lifespan of the DPEP have been complex? In particular, what evidence is there that these curriculum innovation efforts have been self-organising, emergent, non-linear, ambiguously bounded, connected and nested?

Thesis Structure

This thesis will be structured in two sections (See Table 1.1). Section One contains three chapters which review the contemporary literature on educational change and complexity theory before presenting the key tenets of the CEA. To contextualise my personal narrative, the section will finish by reviewing the current curriculum innovation in PE. Section Two also contains three chapters which, from a CEA, explore the DPEP in two chronologically connected phases: the foundation phase between 1987 and 2001 and the delivery phase between 2001 and 2011. The final chapter of the thesis will consider the implications of the CEA for future curriculum innovation agendas.

Table 1.1: Section and Chapter Overview

SECTION 1: Literature Reviews & Complex Ecological Approach **Chapter 2: Educational Change: A Literature Review:** A review of literature on contemporary educational change that concludes by proposing the need for novel approaches to curriculum innovation that will help teachers engage more effectively with the innovation process. **Chapter 3: A Complex Ecological Approach to Curriculum Innovation:** This chapter presents an approach to curriculum innovation that is a synthesis of principles from complexity and ecological theory and elements from 'change knowledge'. **Chapter 4: Review of Literature: Curriculum Innovation and PE:** With primary PE the focus of the DPEP chapters that follow, this chapter reviews the contemporary literature on PE and curriculum innovation.
SECTION 2: The Developmental Physical Education Project (DPEP): A Complex Ecological Curriculum Innovation Case Study **Chapter Five: The DPEP 1987 to 2001: The Foundation Phase:** This chapter considers the impact of contextual factors and personal capacities on my curriculum, pedagogy and professional learning innovation efforts from 1987 until 2001. **Chapter Six: The DPEP 2001 to 2011: The Delivery Phase:** Building from Chapter 5, this chapter also considers the impact of contextual factors and personal capacities on my curriculum, pedagogy and professional learning innovation efforts from 2001 until 2011. **Chapter Seven: The DPEP 1987 to 2011: Complex Ecological Innovation?:** This chapter discusses the extent to which contextual factors and personal capacities have influenced the nature of my curriculum, pedagogy and professional learning efforts across the lifespan of the DPEP. In particular, consideration is focussed on the extent to which these innovation efforts could have been complex in that they have been self-organising, emergent, non-linear, ambiguously bounded, connected and nested. **Chapter Eight: The Complex Ecological Approach: Implications:** This final chapter considers the future implications for the CEA in relation to teachers, and other educators, capacity to influence future curriculum, pedagogy and professional learning agendas.

1.7 Data Sources

The DPEP case study, Chapters Five, Six and Seven, will be presented as a self-study of my curriculum, pedagogy and professional learning innovation efforts in primary PE. A self-study approach is being used as it enables me to look back and investigate my situated self as if it were '*a text to be critically interrogated and interpreted within the broader social, political, and historical contexts that shape our*

thoughts and actions and constitute our world' (Pithouse, Mitchell, & Weber, 2009, p. 45). By employing personal and objective data to explore my professional and academic life as a teacher and lecturer with curriculum innovation aspirations, the study sets out to create a persuasive and inductive case for the CEA as a potential approach to the curriculum innovation process. As such, the study will be framed by three components: the context in which my innovation efforts have taken place, the key components of the CEA and my personal perception of the data or events that most appropriately serve the exploration. This framing is a 'screening device' through which I am able to 'identify with increasing accuracy and expertise what information is worthy of attention in any particular situation' (Kirk, 1992, p. 217). However, I am conscious that I am setting out to construct a balanced and reasoned argument for the CEA based on personal recollections that are plausible, ring true and enable connection (Bullough Jr. & Pinnegar, 2001). I am not setting out to prove the efficacy of the CEA in a causal sense, but to create a broader contextual justification for the CEA components and to achieve insights that will be useful to educators (Cortazzi, 1993). As such, I am not setting out to present the DPEP as a 'success story', but to explore 'the good, the bad and the ugly' in an effort to offer greater insight into the curriculum innovation process.

The actual data sources, to be discussed in more detail in Chapter 3, are both personal and objective. My initial interest in curriculum innovation was not as an academic, but stemmed from a concern about the practical application of PE in primary schools. Consequently, not all of my personal data comes from written texts, but from retrospective reflections on events across the 24 years of the project. The DPEP chapters, therefore, do not use data sources in a conventional sense and

the evidence will not be presented in the traditional manner. Conversely, I will use a scholarly personal narrative approach (Ritchie & Wilson, 2000; Nash, 2004; Pithouse et al., 2009) that enables me to trace the development of my particular concerns and interests while locating them in relation to my own experiences and changing contexts as well as to relevant literature and political issues. The formal personal sources, particularly evidenced over the last decade, are the many texts I have written for academic and professional publication and also for presentation at conferences.

The objective contextualising data includes published texts which come in two main forms: government and government agency publications which set the policy and curriculum context and academic texts which interpret key issues influencing my innovation efforts. For example, government texts include policy papers, parliamentary reports, curriculum guidance and PE reports, while the government agency texts are primarily PE and physical activity reports. Academic texts come from a range of sources, including books and papers from a number of different fields that cover theoretical perspectives, developmental factors, PE, professional learning and policy. Therefore, while the DPEP chapters will not be presented in a traditional research manner, but will provide empirical evidence generated through a self-study set within clear personal and contextual parameters and are an amalgam of my personal reflections and written texts, alongside government, government agency and academic texts that cover a range of theoretical and topical issues. This personal and objective data is being used to construct a case that aims to support the CEA as a possible way forward for future curriculum innovation agendas.

1.8 Chapter Conclusion

This chapter introduces this thesis by proposing that as governments begin to return some autonomy to the education profession, there is an urgent need to develop new approaches to help teachers and other educators engage more effectively with the curriculum innovation process. By synthesising key tenets from complexity and ecological theory with elements of 'change knowledge', this thesis presents a novel Complex Ecological Approach (CEA) to curriculum innovation that has the potential to make a significant contribution in the quest to help develop more participative approaches to the educational change process, particularly in primary PE.

Chapter 2: Educational Change: A Literature Review

2.1 Introduction

Early in the 21st century there has been a growing uneasiness with the top-down, centrally driven educational change projects that have dominated the educational landscape since the 1980s (Hargreaves, 2009). This changing attitude stems from an acceptance that educational reform is much more complex than originally thought (Stoll, Fink & Earl, 2003) and that there needs to be a reconsideration of the relationship between the profession and central government (Goodson, 2001). However, whilst a contemporary literature base offers more inclusive insights into the educational change process, this 'change knowledge' (Fullan, 2004) remains largely within the domain of educational leaders and managers. Teachers[4] are often the passive recipients of these new insights (Hargreaves, 2004). As such, Fullan (2004) has suggested, this missing 'change knowledge' has been the *'fatal element in most educational change efforts'* (p. 2).

As we enter a new era of educational change, there is an urgent need to better understand how to engage teachers in the educational change process (Hargreaves 2005). Creating more participative change environments, however, is not straightforward as it requires the systemic sharing of 'change knowledge' and the emotional buy-in of all key stakeholders (Fullan, 1993). While many teachers support notions of change (Lawn, 1996; Smyth, Dow, Hattam, Reid & Shacklock, 2000), government-driven reforms focussed on standards and accountability frustrate teachers and negatively impact on their confidence and professionalism (Day, 2000;

[4] The term teacher refers to primary and secondary teachers and also subject specialists who work in schools, higher education or as consultants.

Mahony & Hextall 2000; Whitty, 1997). Simply, if '*educational change depends on what teachers do and think'* (Fullan, 2001, p. 115), it follows that significant change is unlikely unless teachers develop the capacity and commitment to engage with change. Encouragingly, new teachers seem more accepting of change when compared to previous generations who were expected to deliver *'prescribed curriculum content and techniques of instruction'* (Tickle, 2000, p. 69). These early-career teachers, however, tend to lack the experience, competence and/or confidence to effectively engage with the change process, particularly in schools whose readiness for change is limited (Hargreaves, 2005).

To move forward, we need to discover ways of aligning local ownership with external accountability (Datnow, 2006) particularly by helping teachers develop and apply those capacities needed to cope with and influence the change process. This chapter sets out to review the contemporary 'change knowledge' literature identifying the capacities that help teachers and other educators create more participative innovation environments. Following consideration of the theoretical background underpinning much of the current educational change literature, further sections present the components of 'change knowledge' and then discuss how these impact upon the innovation process.

2.2 The Theoretical Basis of Contemporary 'Change Knowledge'

Much contemporary educational change literature has its roots in the learner-centred writing of Dewey (1956), Bruner (1968), Piaget (1970) and Vygotsky (1978). Although these academics differed on the fine detail, they were all constructivist theorists who proposed that the learning process is more effective when active, interactive and authentic (Newmann, 1994). Constructivism is based on the notion that our experiences, reflections and interactions help us construct our knowledge, understanding and meaning rather than it simply being passed down or transmitted from external sources. Both as children and adults it is critical we are actively engaged in the learning process. In addition, from a social perspective, interactions between individuals and their environment are perceived as central to the learning process. Vygotsky (1978), the founding father of social constructivism, proposed our potential for learning differs depending on the amount of assistance we are given. He posited that our actual development is what we can do on our own, whereas our potential development is what we can achieve with help from others. His 'Zone of Proximal Development' is the gap between our actual and potential development as determined by problem-solving under guidance or in collaboration with peers (Vygotsky, 1978, p. 86). Social constructivism, therefore, not only supports active learning, it also points to the benefits of interactive learning (Kirk & MacDonald, 1998).

These notions of active and interactive learning have recently been extended, most notably by Lave and Wenger (1991), to highlight the importance of the situated and authentic nature of the context in which learning takes place (Entwistle, Entwhistle & Tait., 1993; Stein, 1998). Core concepts from situated perspectives are similar to

those in ecological psychology (Gibson, 1979/86) and dynamical systems theory (Kugler, Kelso & Turvey, 1980) which are based on the belief that the individual and the environment cannot be defined without each other. By proposing that practitioners generate knowledge within the setting in which they work, situated learning highlights how professionals learn from one another, and especially how newcomers to a profession learn from more experienced practitioners. From these ideas, the notion of 'Communities of Practice' has emerged as small groups of people working together over time as colleagues united by a common goal and a need to know what each other knows (Wenger, 1998). Within an institution, many different 'communities of practice' may operate at any given time and most people belong to at least one but usually more. For example, in a school setting, although the main 'community of practice' may be the teaching staff, other 'communities of practice' involve support and administration staff, parents, children and external agencies.

The 'community of practice' becomes a useful concept for the change process as it highlights how everyone within a particular community is a learner and both actively and interactively involved in the process of authentic and situated learning. With its basis in constructivist thinking, contemporary educational change literature supports the notion that all members within an education community should be engaged as active contributors and learners. As will now be discussed, this viewpoint has many implications for educational change agendas.

2.3 'Change Knowledge' and Capacity for Change

What is 'Change Knowledge'?

'Change knowledge' is the *'understanding and insight about the process of change and the key drivers that make for successful change in practice'* (Fullan, 2004, p. 4). Although 'Change knowledge' is multi-factorial most elements can be categorised under three headings as follows (see figure 2.1):

- The change context is the environment into which an innovation is introduced
- The change process puts the innovation into practice
- The curriculum innovation is the new idea being introduced: the *'new stuff that is made useful'* (McKeown, 2008). Although understanding the innovation is necessary, by itself, this is insufficient to bring about change.

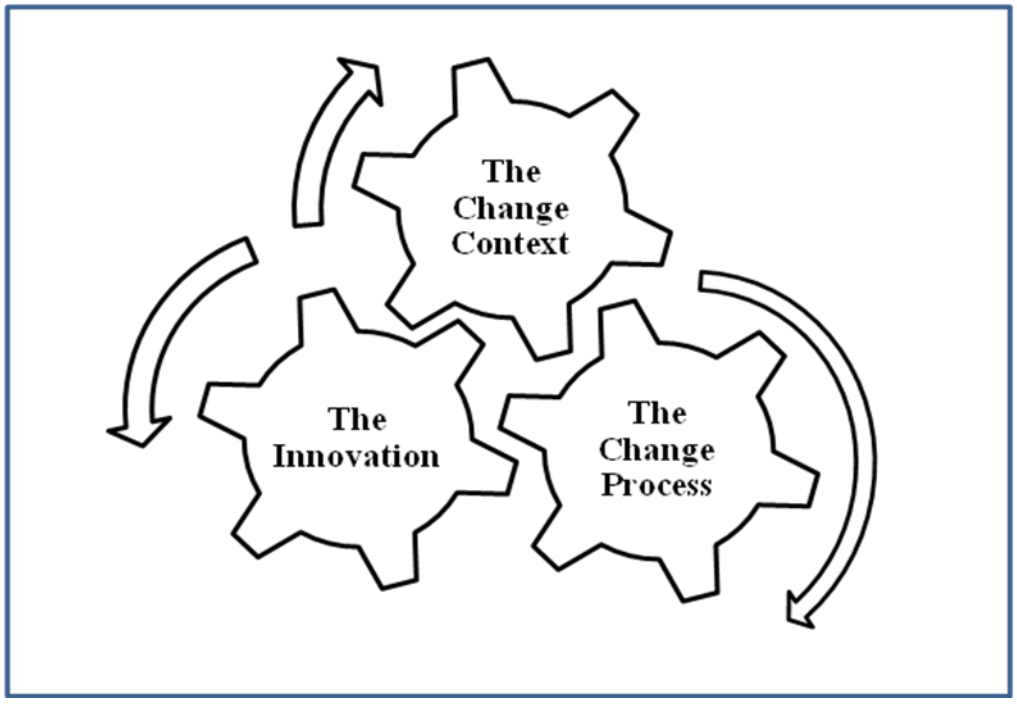

Figure 2.1 The Interconnected 'Change Knowledge' Categories

Building Capacity: Cognitive Emotional and Participative

Building capacity to cope with and influence change requires a long term commitment from teachers to *'engage individually and collectively in continuous, challenging and purposeful consideration of their professional responsibilities, their beliefs, their skills, their motivations and their practices'* (Stoll, 1999, p. 121). As a participative process (Hargreaves, 2005), building change capacity is emotionally challenging because teachers need to apply their 'change knowledge', work regularly with colleagues (Stoll, 1999) and reflect on the outcomes of their change efforts. It is therefore critical that teachers are able move beyond the notion of change as a 'quick fix' and towards developing a lifelong capacity for change (Senge, 1990).

With change likely to be an ever present feature of education systems in the future (Day, 1999), capacity building and 'change knowledge' become key attributes to help the education profession move confidently into a new era of uncertainty. As we gradually see the nature of educational change shift from being a top-down, externally-driven endeavour, a more participatory process focussed on lifelong learning and continuous capacity building is emerging (See Table 2.1). However, although 'change knowledge' is central to capacity building, Fullan (2007) suggests that we need to '*assume that lack of capacity is the initial problem and then work on it continuously'* (p. 44). The remaining sections of this chapter will investigate each of these 'change knowledge' categories, i.e. change context, change process and the innovation, to help consider how this knowledge can help support teachers' capacity building.

Table 2.1 An Overview of the Shifting Nature of Educational Change

	Centrally-Driven Change	Participative Change
Purpose of Educational Change (Curriculum Innovation)	Mastery to Deliver Innovations • Knowledge, Skills & Competencies	Building Capacity for Change • Lifelong learning to cope with and influence and initiate ongoing change
The Change Context	Tri-level Dislocation • Top-down • Externally-driven	Tri-level Integration • Integrating bottom up and top-down • Local autonomy aligned with external accountability
The Change Process	A Passive Endeavour • Quick fix • Episodic • Emotionless • External vision • Immediate Mastery • Individually-focussed	Participatory • Complex and Iterative • Emotional • Inquiry & reflection • Vision making • Lifelong Mastery • Collaborative
Innovations	Finished Product • External innovation-creation • Fixed products	Evolving Product • Internal and external innovation-making • Organic products

2.4 The Change Context

Educational change does not exist in a vacuum but is influenced by the context in which it is taking place. Whilst the classroom context directly impacts on teachers and children, the change context extends beyond this immediate environment to include the interconnecting school, local authority and national government. These different levels of the education system have been termed the tri-level context (Barber & Fullan, 2005) (see Figure 2.2)

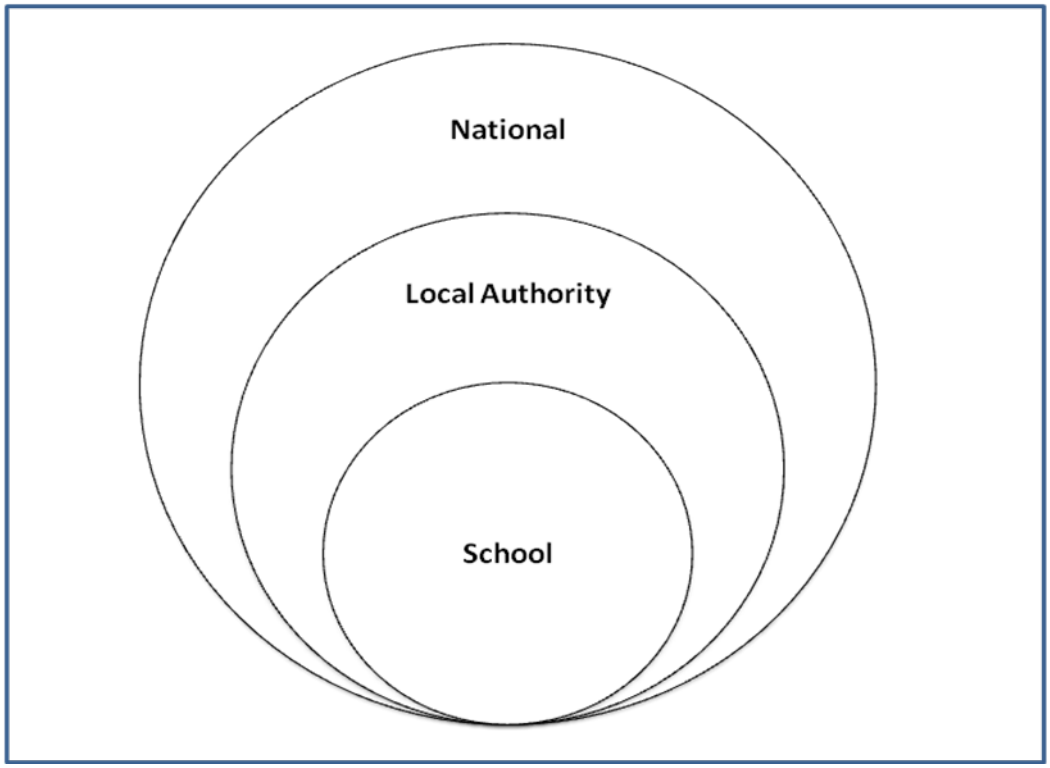

Figure 2.2 The Tri-level Context for Educational Change (adapted from Barber & Fullan, 2005)

Viewing the change context in this tri-level manner has resulted in 'change knowledge' generally being directed towards the leaders and managers within the system (Fullan, 2009) with teachers marginalised. If we are to acknowledge that each level of the system influences the other, it is important to better understand each of the levels and the nature of the connections between them (Datnow, 2006). The following section considers the key 'change knowledge' messages emerging from each of these levels: the government, local authority and school levels of the systems.

The Government Context

Much of the contemporary educational change debate stems from the different approaches taken by governments towards education. Until the late 1980s, government tended to take a 'hands-off' role in educational change (Ward & Eden, 2009) allowing the education profession a significant degree of autonomy. Educational change projects were mostly instigated and driven by schools (Goodson, 2001) with teachers seen to be central to the curriculum innovation process (MacDonald & Walker, 1976; Stenhouse, 1975). At this time, this autonomy helped the education profession develop a sense of 'collective confidence' (Rudduck, 1991). However, early research projects identified problems with the management of these innovation projects with most being considered unsuccessful (Fullan, 1972).

From the early 1980s, particularly in England, professional autonomy began to evaporate under a *'surge of educational change, reform, legislation and government intervention with government getting its hand on the curriculum, assessment, inspection, childcare and teachers' practice'* (Ward & Eden, 2009, p. 13). Long held social justice goals were sidelined and resulted in an *'overriding emphasis on policy making for economic competitiveness'* (Ball, 2008, p. 12). Education became increasingly subjected to *'the normative assumptions and prescriptions of economism'* (Lingard, Ladwig & Luke, 1998, p. 84). Globalisation, the knowledge economy and performativity all emerged as key concepts in the shifting education policy arena. Reforms increasingly focussed on raising achievement and teacher accountability (Day & Smethem, 2009) leading to concerns about educational change being completely initiated from outside the profession (Webb & Vulliamy, 1999). Change agents within institutions were faced with a *'crisis of positionality'*

(Goodson, 1999) often having to be advocates and drivers of externally-generated projects they did not support. Although top-down centrally-legislated change was readily transferable across institutions (Fullan, 2000), internal ownership, so important to 'collective confidence' was being eroded and led to high levels of staff de-motivation and feelings of being devalued (Hargreaves, 2004). Teacher morale was negatively affected with reported increases in frustration and resistance to change (Fink & Stoll, 1998).

In Scotland, where much of this thesis is set, the education system had a degree of autonomy (Paterson, 1997) and continued to make efforts to hold onto a 'traditional' democratic and egalitarian distinctiveness (Humes, 2008). The centrally-driven performativity agenda and pace of imposed change were less developed than in England and the professional voice of teachers remained relatively stronger (Arnott & Menter, 2007). Consistent with England and other countries, however, Scottish teachers were no more satisfied with the manner of educational reform, complaining of innovation overload, restructuring of promotion opportunities and consistent accountability measure (Arnott & Menter, 2007).

However, as noted, by the 2000s governments were aware that centrally-driven educational reform was not working and that the translation of policy into practice was not a simple linear process of *'conception, consultation, development, implementation and evaluation'* (Humes, 2008, p. 77). It has been highlighted how policy dissemination is at best '*unwieldy and complex'* (Ball, 1990, p. 3) because *'the rhetoric, texts and meanings of policy makers do not always translate directly and obviously into institutional practices... they are inflected, mediated, resisted and misunderstood, or in some cases simply prove unworkable'* (p. 7). Consequently,

although governments will remain heavily involved in education change agendas, we appear to be entering an era in which there is a need to better understand how local ownership and external accountability can be better connected to enhance ongoing educational development (Datnow, 2006; Fullan, 2006).

Following a long period when teachers lacked professional autonomy, the education profession is now being offered the opportunity to more directly participate in the educational change process. To effectively engage in this process, teachers will not only need to develop an understanding of 'change knowledge', but will also need to be able to engage in external accountability discourses (Fullan, 2007).

The Local Authority Context

One of the key goals of the conservatives during 1980s and 1990s was to sideline local education authorities in England (Ball, 2008). As a consequence, local authorities lost much of their power with the result that *'the role and action of the (local authority) middle tier remains an under-researched area.'* (Chapman & Hadfield, 2010, p. 221). In Scotland, attempts at marginalising local authorities were less successful, although the focus of Scottish local authorities has shifted from its original supportive role to one of pressure and improvement. Subject advisors are being replaced by quality improvement officers (QIOs) whose roles are increasingly to work to disseminate national policy. Humes (2008), highlights the difficulties faced by these local authority 'intermediates' whose limited power finds them caught between a government wanting to drive forward a change agenda and teachers and local contexts with differing levels of awareness and receptiveness and often wish to

transmit the constraints and pressures back to government. Nevertheless, unlike in England where the power of the local authority has gradually been denuded, local authorities in Scotland still retain considerable influence on the direction of the local education system (Bryce & Humes, 2008).

The School Level

While the original research investigating school effectiveness in the USA (Coleman, Campbell, Hobson, McPartland, Mood, Weinfeld & York, 1966) reported schools having less impact than anticipated, a series of large scale studies in the 1970s and 1980s consistently demonstrated schools did matter (Berman & McLaughlin, 1975; Rutter 1983; Mortimore, Sammons, Stoll, Lewis & Ecob, 1988). When the original Berman & McLaughlin (1975) 'Rand' study was revisited, McLaughlin (1990) reported that an enduring finding was that national policy cannot mandate change, but local capacity and will are key to the achievement of educational outcomes.

On the back of these positive findings, school effectiveness and school improvement studies became prominent (Hopkins & Reynolds, 2001) and had a strong influence on the direction of educational change projects. Findings from these early studies offered strong support for the neo-liberal conservative policies e.g. the importance of high expectations of pupil attainment and frequent assessment of pupil progress (Scheerens, 2004), and added support for the top-down, performativity agendas of the day. However, school effectiveness research soon began to receive considerable criticism based on its perceived connection to a particular ideology of social control which set out to engender an overly 'mechanistic' view of the organisation of the school and its working (Elliott, 1996; Slee, Weiner & Tomlinson, 1998; Thrupp,

1999). As a consequence, and with the growing awareness that top-down approaches were not working (Fullan, 2009), recent research has highlighted the importance of school characteristics more aligned with the principles associated with contemporary 'change knowledge'.

Schools are increasingly being viewed as professional learning communities (PLCs) which are considered to involve '*a group of people sharing and critically interrogating their practice in an ongoing, reflective, collaborative, inclusive, learning-oriented, growth-promoting way, and operating as a collective enterprise'* (Stoll, Bolam, McMahon et al., 2005, p. 5). Subsequently, Stoll et al (2005) have identified key characteristics of capacity building PLCs that include shared values and vision, collective responsibility and collaboration. Successful schools are increasingly being characterised by the active participation of all members in a collaborative learning culture, which is a significant shift in attitude from those contexts in which learning was '*the sole domain of those vested with power in a hierarchy of knowledge relationships*' (Cocklin, Coombe & Retallick, 1996, p. 2). Therefore, while the original school effectiveness literature was connected to top-down centrally driven policy agendas, more recent developments have focussed on capacity building around the more socially constructed notions of learning communities.

Section Summary

This section has highlighted how much of the contemporary literature on the change context focuses on three government, local authority and school levels of the system and tends to portray teachers at the receiving end of externally-driven initiatives. As

such, as we move into a new era of educational change in which moves are being made towards more inclusive and collaborative innovation cultures, it is essential that teachers have the opportunity to gain ownership of their immediate education context while at the same time acknowledging and negotiating the external accountability measures that will inevitably be put in place by governments.

2.5 The Change Process

With the limited success of large scale top-down educational reforms the focus of the more recent educational change literature has been directed to those capacity building factors that support the change process (Stoll, 2009). This section concentrates on five interconnected 'change knowledge' factors that have received considerable attention in literature; Emotions; Inquiry and Reflection; Personal Vision; Mastery and Collaboration (see Figure 2.3)

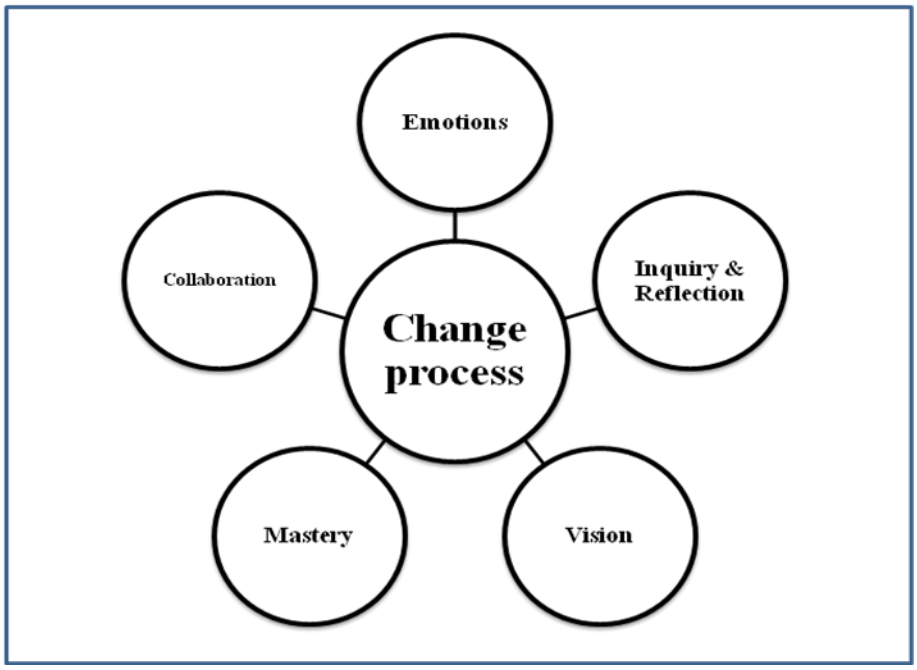

Figure 2.3 Key 'Change Knowledge' Factors influencing Educational Change

Emotions

While emotions have been shown to play a significant role in the educational change process (Reio, 2005), teachers' responses are usually considered '*in rather cognitive, rational terms, failing to articulate the layers of emotion that seem to be involved'* (Van Veen & Lasky, 2005, p. 895). As Hargreaves suggests '*it is as if teachers think and act; but never really feel*' (Hargreaves, 1998, p. 559). Emotional considerations, however, are beginning to receive more attention, largely in response to the impact of the top-down accountability reforms which have consistently created negative emotional response from teachers (Day, 2001). Hargreaves (2004) points to frustration as the 'overwhelming' response because teachers are not listened to or able to achieve personal goals with resistance becoming a predictable response (Fink & Stoll, 1998).

However, although top-down approaches have been shown to have a negative emotional impact, actively engaging teachers in the change process is not easy. Research consistently shows professional identities resistant to change (Beijaard, Meijer & Verloop, 2004), often for emotional reasons (Van Veen, Sleegers, Bergen & Klassen, 2001). For example, many teachers need convincing to devote time and effort to change, particularly if they perceive themselves overworked (Earl & Lee, 1998) or successfully employing practices developed over many years (Rogers, 1995). They need to feel confident that innovations will bring positive change (Stoll, 1999) and want the opportunity to experiment with new ideas before they adopt them. Some teachers, however, are constrained by a range of factors holding them back from change: these include perceptions of uncertainty, fear of failure, preference for the current situation, the status quo and the potential loss to their

professional credibility (Havelock & Zlotolov, 1995; Ponticell, 2003). This problem can be exacerbated as perceived gains from change efforts are often not realised until mastery is achieved. Fullan (2004) suggests that developing mastery requires the confidence and patience to work through the 'implementation dip' (see Fig 2.4). In some cases, even when the change direction is clear, many teachers present themselves as incompetent and, to save face, prefer to stick with their current practices (Black & Gregersen, 2002, p. 70).

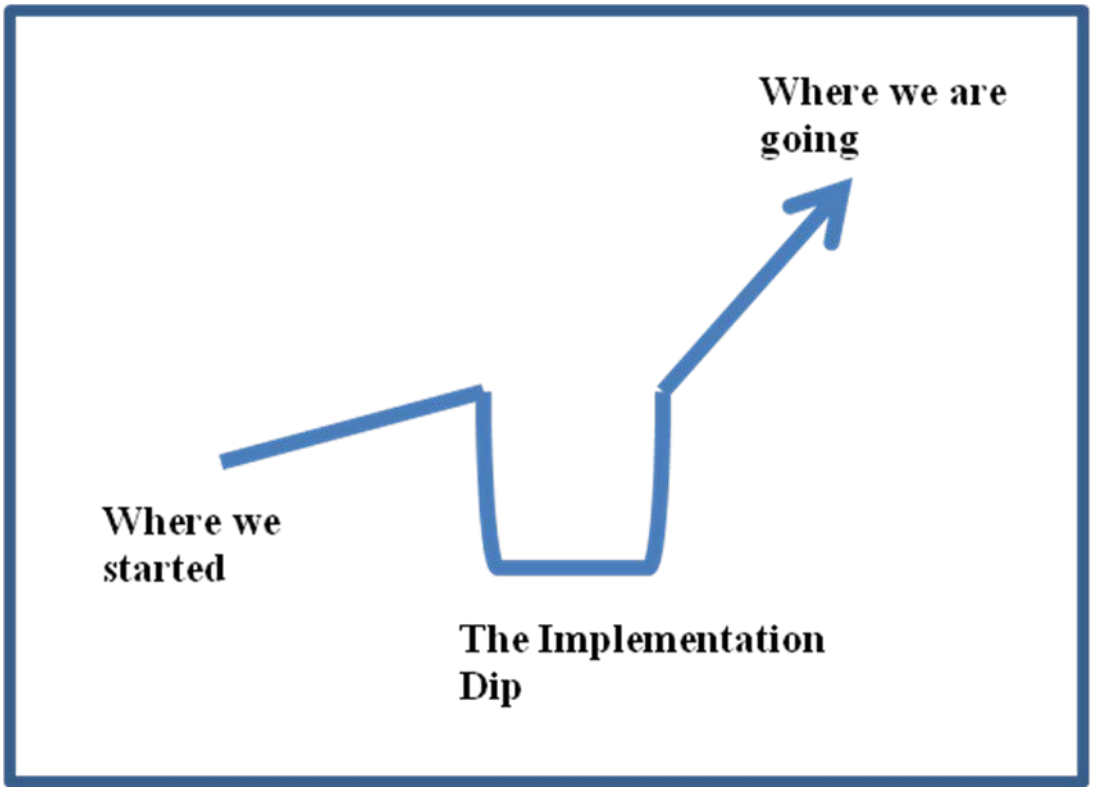

Figure 2.4: The Implementation Dip (adapted from Fullan, 2004)

Therefore, while emotions play a key role in the change process there is growing awareness (Hargreaves, 2004) that we need to better understand and positively influence the emotional responses of teachers towards the innovation process.

Inquiry & Reflection

Building change capacity involves long term learning (Stoll, Fink & Earl, 2003). Without this learning, teachers' practice will often remain static and they will begin to lack the confidence or commitment to engage with the change process (Borko, Elliott & Uchiyama, 2002). Subsequently, it is being increasingly recognised that teachers need to adopt an inquiry approach to help them internalise 'norms, habits and techniques' for continuous learning and also to develop personal and collective purpose (Fullan, 1993). However, these skills and purposes are not static and need to be extended by information, ideas and dilemmas and supported by ongoing reflection.

The role of reflection in capacity building cannot be overemphasised as it supports, consolidates and evaluates practice and also feeds back into the inquiry process. Connected to notions of social constructivism, reflective practice helps teachers develop in-depth understanding about their practice and create opportunities for continuous learning and ongoing inquiry. However, to gain this new insight, teachers need to assume a dual actor/critic role to analyse their performance (Osterman & Kottkamp, 1993). They need an honest understanding of their own and others practice informed by the ideas, or theories, framing their actions. Recently, Pollard, Collins, Simco et al. (2005) have summarised seven key strands of reflective practice in teaching (see Table 2.2)

Table 2.2 Seven Characteristics of Reflective Practice (adapted from Pollard et al., 2005)

1. Active concern with aims, consequences, means and technical efficiency
2. Continuous cyclical process of monitoring, evaluating and revising practice
3. Needs competence in evidence-based classroom enquiry to support higher teaching standards
4. Requires open-mindedness, responsibility and wholeheartedness
5. Based on teacher judgement, informed by evidence-based enquiry and insights from other research
6. Enhanced by dialogue with colleagues
7. Enables teachers to creatively mediate externally developed frameworks

This table highlights the on-going and complex nature of reflection in terms of its focus on the cognitive, social, emotional and applied aspects of practice. In addition, it highlights how reflection supports the knowledge and continuous learning that helps teachers cope with externally-driven change agendas. As teachers develop a focus on continuous learning, inquiry and reflection are critical aspects of capacity building process.

Personal Vision

If the education profession and governments are to work in a more participative manner, it is not only the leaders and managers who need to hold a vision for

education. Teachers must find their own way to *'take a stand for a preferred future'* (Block, 1987, p. 102). Specifically, a clear personal vision will give teachers meaning to their work and will be a key part of capacity building (Senge, 1990). Many teachers, however, currently work in linear, top-down environments where they are likely to lack the experience and confidence to articulate and share their personal visions (Fullan, 1993).

A personal vision should not be static but constantly examined and reworked as new knowledge, experiences and different context factors emerge and feed back. For example, when teachers articulate a vision, it will often connect with notions of moral purpose and social justice. Although these views have long been considered key drivers of educational change (Day, 1997; Stoll & Fink, 1995; MacBeath, 2005; Fullan, 2007) many governments view education as a means to economic prosperity (Brain, Reid & Boyes, 2006). Teachers will therefore need to be realistic in setting the parameters of their vision and acknowledge that some degree of external accountability and adaptability will be inevitable.

If teachers are to make a significant contribution to future change agendas, they will need to be able to articulate, share and negotiate their personal vision for education. As Fullan (1993) has said *'personal purpose is the route to organizational change'* (p. 14), but only if teachers are supported in the development, articulation and sharing of their vision, otherwise they are likely to remain on the receiving end of externally-driven change agendas.

Mastery

While mastery of a curriculum innovation is a prerequisite of the change process, it is not only about the acquisition of new understanding and behaviour, it is a long term capacity building activity. As Senge (1990) has commented, *'People with a high level of personal mastery live in a continual learning mode. They never 'arrive'. Sometimes, language, such as the term 'personal mastery' creates a misleading sense of definiteness, of black and white. But personal mastery is not something you possess. It is a process. It is a lifelong discipline.' (*Senge, 1990, p. 142).

Developing mastery is not easy although a number of key conditions are likely to lead to more fruitful mastery attempts. For example, in the early stages of the curriculum innovation process, identifying the initial conditions (Senge, 1990) and appraising the readiness to engage with change (Fullan & Hargreaves, 1992) offer an important starting point. Teachers also need to take ownership of their mastery attempts by giving time, formally and informally (Ely, 1999), and constructing their own meanings and understandings. Mastery is not simply about copying others (O'Sullivan & Deglau, 2006), but support from management and colleagues plays a key role in sustaining engagement (Fullan, 1993)

This necessary commitment to mastery is an emotionally challenging experience. It *'can be very threatening...*(because)*...to change or to try something new means to risk failure.'* (Guskey, 2002, p. 387). For some this process empowers, raises self esteem and fuels future attempts whereas others find it frustrating, confidence sapping and leads to a reluctance to engage with future change (Fullan, 1991). As noted, teachers also need to cope with the implementation dip in the early stages of

change (Fullan, 2004). Working through this dip is an important capacity building experience as it helps teachers understand that learning goes through an awkward phase which requires patience and resilience. While mastery is a long term commitment to learning, teachers need to understand how to acquire specific mastery while, at the same time, be realistic about their capacity in relation to innovations and context in which they work.

Collaboration

In recent years, collaboration has emerged as a key factor influencing the change process (Day, 1999; Peters, 2001), particularly for the creation of effective learning communities (Stoll et al., 2005). With its social constructivist roots, collaboration builds on the ceiling effect of personal learning (Vygotsky, 1978) and *'takes teacher development beyond personal, idiosyncratic reflection, or dependence on outside experts, to a point where teachers can learn from each other, sharing and developing their expertise together'* (Hargreaves, 1994, p. 183).

Productive collaborative learning, similar to mastery, is difficult because of the time and emotional commitment required and the complex nature of the collaboration process. Many barriers to successful collaboration have been indentified and include:

1. A group's lack of willingness to reciprocate or set realistic expectations (Havelock & Zlotolov, 1995)
2. A lack of expertise to share meaningfully (Day, 1999)
3. The confusing of superficial cooperation with in-depth collaboration (Day, 1999)

4. Staff being compelled hierarchically, to collaborate in contrived contexts or being discouraged away from 'edgy' forms of collaboration e.g. when views are different from the 'party line' (Hargreaves, 2005) .

These four barriers highlight the challenging nature of the collaborative process and highlight the need for, among other things, resilience: a mix of flexibility and persistence to overcome the inevitable challenges and difficulties that emerge.

Teachers should, however, not only collaborate within their own institution but with other schools and organisations to learn from and contribute to a wider capacity building. Stoll (2009) suggests that this lateral capacity building (Fullan, 2004) is best developed through 'school-to-school learning networks' which help individual schools build capacity but also move '*ideas and good practice around the system' (*p. 117). These are not superficial networks, however, but use external expertise as a stimulus for dialogue to challenge assumptions and build capacity.

If collaboration is to be a central component of capacity building, then leaders and managers will also need to shift from being top-down transmitters of directives to become leaders who invest in capacity-building that creates collaborative cultures of continuous learning (Fullan, 2002). Distributed leadership cultures will need to be developed to support teachers and others as leaders enabling them to learn in collaboration with others throughout the system (Hargreaves & Shirley, 2009). Leaders also need to use appropriate pressure and support approaches to help staff set ambitious targets with transparent monitoring while supporting the development of new skills, accessing of ideas and resources and creating more time for collaborative learning. Fullan (2004) has suggested that, over time, the more pressure and support

become seamless, the more effective the change process will become. However, given the top-down nature of many management structures across the education systems, it is likely many leaders and managers will find the transition to more collaborative working problematic. Many may perceive this change as a loss of the power which has been an inherent part of their work culture.

Much of the recent literature supports the view that both internal and external collaboration are central to the change process as they are the only way to connect the vision of the different stakeholders and mastery of the different individuals within and across the system. While this will be difficult in many situations, particularly following many decades of top-down projects, building capacity for change will not happen without collaboration.

Professional Learning and the Change Process

Traditionally, continuing professional development (CPD) or professional learning has been viewed as the transmission of a narrow body of 'knowledge and skills' generated by experts (Hargreaves, 1992) and still involves sporadic, one off, short duration, off site courses. In recent years, this approach to professional learning has been heavily criticised for a range of reasons that include:

- detachment from the workplace (Retallick, 1997),
- lack of differentiation (Lieberman & Grolnick, 1997),
- disregard for the emotional nature of learning (Hargreaves, 1997a; 1997b)
- the lack of attention to learning, particularly career-long learning (Zuber-Skerritt, 1992; Day, 2000).

- passive engagement of teachers (Armour & Yelling, 2004)

As a consequence, approaches to professional learning are beginning to change and mirror many of the 'change knowledge' factors discussed in this section. At the heart of this change is the acknowledgement that teachers' are active lifelong learners who are constantly engaged in a capacity building process to cope with and influence innovation (Stoll, 1999).

As professional learning begins to change focus, research is increasingly supporting the view from the literature that CPD is best when active (Day, 1999), reflective (Duncombe & Armour, 2004), on-going (Day, 1999) and collaborative (Hip, Juffman, Pankake & Olivier., 2008). Wright, Konza, Hearne and Okely (2008) propose that professional learning is most effective when 'shared understandings and common language sustain innovations and reduce the stress of change' and when teachers are allowed to reflect upon their practice (p. 51). The notion that individuals learn best when knowledge is considered as socially constructed and created relative to teachers' prior and existing knowledges and practices (Rovegno & Dolly, 2006, p. 242) has gained increasing currency in education.

O'Sullivan and Deglau (2006), suggest that teachers 'should be treated as "active learners" who construct their own meanings and understandings from active participation' in professional development communities (p. 446). Collaborative contexts, therefore, become an important means for teachers to develop their practice whilst also advancing education in their local schools and communities (Armour, 2006).

Section summary

This section has highlighted how much of the contemporary change process literature has concentrated on five key interconnected capacities; emotions, inquiry and reflection, personal vision, mastery and collaboration (see Figure 2.3). The change process is beginning to be viewed less as a depersonalised and linear 'fill the empty vessel' endeavour and more as an emotional and collaborative experience which involves the use of inquiry and reflective skills to support the long term development of personal vision and mastery (Fullan, 2004). As teachers develop a better understanding of these process factors, they will not only begin to build their personal capacity for innovation but will also start to view themselves as lifelong learners seeking to work with like-minded individuals in contexts that are focussed on learning, innovation and change

2.6 Understanding Innovations

Although curriculum innovations are a key part of the educational change process, they have received limited attention in the contemporary literature (Rogers, 1995). This is largely because governments have taken over the role of curriculum designers (Tickle, 2000) with the result that curriculum innovations are viewed as an externally controlled phenomenon with teachers seen as adopters. This top-down approach has also seen curriculum innovation become product driven (Van Vught, 1989) and has resulted in 'quick fix' curriculum programmes often being the norm (Albrecht & Engel, 2007). Many CPD providers consolidate this idea of 'fixed' knowledge by creating courses and support materials to mirror these centralised curriculum

initiatives (Armour & Yelling, 2004) turning professional learning into a linear process focused on the transmission of set content (see Figure 2.5)

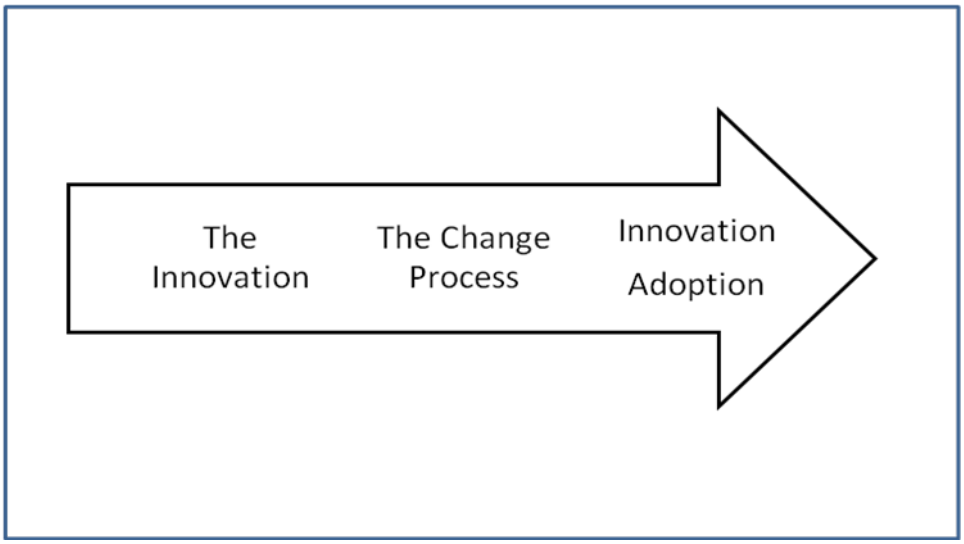

Figure 2.5 Innovations as Fixed Products in a Linear Educational Change Approach (adapted from Ellsworth, 2000)

This notion of a fixed curriculum, however, is at odds with a constructivist view which proposes that curriculum evolves and changes over time through an ongoing innovation process (Van Vught, 1989). Curriculum stops being exclusively an external creation but an integral part of the local environment. Those involved in curriculum innovation at the local level, therefore, not only need to develop a better understanding of the change process but also the nature of curriculum innovations.

Understanding Curriculum Innovations

While the key characteristics of innovations have been identified for a number of years (Rogers, 1995), much of this 'change knowledge' is rarely shared with teachers. This has particularly been the case in recent years as central governments have taken control of the curriculum-making process. However, with teachers increasingly being expected to take more interest in curriculum innovation (Scottish

Executive, 2004a), three features from this literature offer useful support: relative advantage, compatibility, complexity.

Relative Advantage

While the adoption of a curriculum innovation is more likely when it is perceived to have relative advantage over the practices it aims to replace, this raises important issues for the nature of a curriculum innovation (Ellsworth, 2000). In the current era of policy overload (Ball, 2008), the attraction of the 'quick fix' programme with its short CPD course has become evident (Hargreaves & Shirley, 2009), even if there is little evidence to support any long term impact of such courses (Joyce & Showers, 1988; Duncombe & Armour, 2004). As a consequence, curriculum innovations with longer impact and adoption periods and implementation dips are often perceived to be less advantageous than short term solutions. If localised curriculum innovation is to be successful and learning-focussed, all those involved need to be aware of the short and long term implications of the development process, and give close consideration to the short term 'hook' for potential adopters.

Compatibility

The extent to which an innovation is compatible with the values, experiences and perceived needs of potential adopters influences the likelihood of adoption. Three concepts are worthy of consideration; positioning, technology clusters and indigenous knowledge systems (Rogers, 1995). Positioning innovations in terms of similarities or differences to existing practice impacts on adopters' perceptions of an innovation. Innovations perceived too similar or directly competing with existing practice are less likely to succeed. In particular, innovations that are out of line with

current government policy will find it difficult to receive support. The initial positioning of an innovation in relation to current or situated practices is a critical feature of adoption, particularly before it has been tried out by potential adopters. Similar to positioning, a compatible 'technology cluster' is apparent when innovations are integrated into a coherent package that is considered mutually reinforcing e.g. courses, textbooks and exercises. An innovation perceived compatible with the 'cluster' may be adopted singly, but one perceived incompatible is more likely to be rejected (Ellsworth, 2000). The final compatibility concept, the indigenous knowledge system, contains the locally created knowledges and practices passed down over many years. These shared knowledges influence local practice and openness to innovation and have a powerful influence on an innovation's potential adoption. Again, innovations that are too similar or too different may be less likely to be adopted in a local context. Rogers (1995) also highlights how this indigenous knowledge is normally created by 'master practitioners' who are regarded as experts within the local system. If an innovation competes with the knowledge which confers 'master practitioner' status, these 'indigenous experts', as I will refer to them from here, may have the influence and network to erode compatibility perceptions among other intended adopters. Compatibility, as will be discussed throughout this thesis, has a significant influence on a curriculum innovation's 'adoptability', particularly in the early stages, and highlights how innovation-makers should develop a detailed understanding of the contexts into which they intend to introduce an innovation.

Complexity

Innovations focussing on lasting change tend to move beyond the simplicity of the 'quick fix', are often more theoretically-driven and are more complex in their make-up. These longer term, complex innovations may be considered difficult to understand or adopt and are likely to disseminate more slowly. This is particularly the case for more theoretical innovations where there may be problems understanding what the innovation is intended to achieve or how it is to be carried out. Complex innovations often need to be refined and repackaged, so that there is something in the short term to 'hook' potential adopters. This repackaging has been recently observed with the Curriculum for Excellence in Scotland which has been rewritten to '*make it clearer*' (Lee, 2010).

Section Summary

As curriculum innovation moves into a new era in which localised development is being encouraged, teachers and other education professionals will need to be supported in their innovation efforts. From an innovation perspective, the three innovation characteristics discussed above provide some guidance about key considerations curriculum innovators should 'build into the innovation to facilitate its acceptance by the intended adopter' (Ellsworth, 2000, p. 40). In particular, by 'hooking' adopters early, connecting to local priorities, simplifying complexity and working to create contexts for ongoing development, teachers will have a much better chance of influencing the direction and focus of innovation in their own school contexts.

2.7 Chapter Summary

This chapter has presented the view that the growing uneasiness with top-down, centrally driven educational change projects has led to a reconsideration of the relationship between the education profession and central government (Goodson, 2001). For this relationship to move beyond rhetoric and become a reality, it was proposed that there is an urgent need to better understand how to engage teachers in the educational change process (Hargreaves, 2005). The chapter has subsequently reviewed much of the contemporary 'change knowledge' literature that offers *'understanding and insight about the process of change and the key drivers that make for successful change in practice.'* (Fullan, 2004, p. 4). Categorised under three main headings: the change context, the change process and the innovation, this 'change knowledge' has been identified as a key factor in developing those capacities that will help teachers and other educators cope with and influence the curriculum innovation process. Instead of being seen from a top-down, linear, reductionist and 'quick fix' perspective, educational change has been presented as a more organic, inclusive and long term process based on five interconnected elements: emotions, inquiry and reflection, vision, mastery and collaboration. Although this 'change knowledge' challenges the top-down performativity agendas that have held sway in education for the last 20-25 years and creates a foundation to inform future curriculum innovation projects, there are a number of key issues yet to be addressed:

1. Whilst current 'change knowledge' is underpinned by constructivist thinking, and considers educational change as an interconnected process, there is a tendency

for the literature to present ‘change knowledge’ as a list of concepts (Stoll, 1999) or lessons (Fullan, 1993). The overall impression is a series of valuable, but loosely connected, or even disconnected, concepts. While the tri-level development model sets out to address this detached issue by proposing linkage across school, local authority and national levels (Barber & Fullan, 2005) there is, as yet, little known about the connections between the different levels of the change context (Datnow, 2006). Further, the limited focus of this tri-level systems-wide approach not only marginalises the teachers’ role in the innovation process, but also pays little attention to those global issues which are becoming an increasingly influential feature of educational policy around the world (Rizvi & Lingard, 2009). As a consequence, there is a tendency for authors interested in educational change to focus on a particular level of the change context e.g. global (Rizvi & Lingard, 2009), national (Ball, 2008; Ozga, 2002; Whitty, 2002), school (Harris, 2002) and teachers (Day & Smethem, 2009), thus reinforcing the compartmentalised nature of the educational change literature.

2. The continued focus on large scale educational change (Howie & Plomp, 2005; Fullan, 2009) and the key role of change leaders (Hallinger, 2003), although often articulated in an inclusive manner, consistently relegates the teacher to the role of ‘change recipient’. Educational change remains largely under government control and top-down educational change continues to be propagated with teachers having little input to the curriculum innovation process (Humes, 2008). It could be argued that teachers continue to be seen as a depersonalised ‘unit of change’ and not really as an emotional being (Hargreaves, 2004).

> Whilst recent developments in Scottish education have specifically set out to take a more integrated and more inclusive approach to curriculum development (Scottish Executive, 2004a), it will be some time before the impact of this different approach can be effectively evaluated in practice.

Considerable progress has been made in terms of our understanding of, and ability to make use of, 'change knowledge', but there is still some way to go before 'change knowledge' becomes a regular or constant feature of educational discourse, particularly for teachers. While it is important to consolidate the positive features of recent educational change, it is proposed there is an urgent need to extend the scope of 'change knowledge' towards a more conceptually connected concept that enables teachers to play a more effective and long term role in the curriculum innovation process. The next chapter sets out to build on this contemporary 'change knowledge' by presenting a complex ecological approach to curriculum innovation. It is proposed this novel approach will go some way to addressing the issues raised above and support teachers and other educational professionals in their efforts to build the capacity to cope with and influence the curriculum innovation process.

Chapter Three: A Complex Ecological Approach to Curriculum Innovation

3.1 Introduction

Following decades of centrally-driven curriculum innovation, the previous chapter has explored how contemporary 'change knowledge' (Fullan, 1993) has instigated a gradual re-defining of educational change as a more participative, constructivist and collaborative endeavour. However, although 'change knowledge' offers a better understanding of the contextual and personal factors influencing the change process, a number of important limitations were identified which have yet to be adequately addressed. In particular, it was highlighted that 'change knowledge' has been presented as a list of loosely connected concepts (Stoll, 1999) or lessons (Fullan, 1993), has been primarily directed towards leaders and managers as change agents (Hallinger, 2003) and has tended to marginalise the role of teachers in the innovation process (Day & Smethem, 2009). This last point is particularly pertinent in the current Scottish education context in which the government has specifically set out to create a more participative approach to curriculum innovation (Scottish Executive, 2004a). While it is important to consolidate the positive features from this contemporary educational change literature, there is an urgent need to reconsider 'change knowledge' from a more conceptually connected and globally participative perspective so that teachers, and other professionals, will be able to play a more effective role in the curriculum innovation process. Consequently, this chapter presents a complex ecological approach to curriculum innovation which sets out to address many of these limitations and, in particular, to support teachers and other

educational professionals in their efforts to build the capacity that will help them cope with, negotiate and influence future curriculum innovation agendas.

3.2 Why a Complexity Lens?

In efforts to consolidate and extend the current educational 'change knowledge', it is important to acknowledge the implications of the gradual shift in the way society has been viewed over the last 30 years. The proliferation of post-modern theoretical perspectives within the social sciences (e.g. post-colonialism, feminism and interpretivism), alongside different approaches being taken to study the developing child (e.g. mechanistic, organisimic and nativist theories), are all indicative of a world increasingly attuned to notions of unpredictability and uncertainty (Morrison, 2003). From a change perspective, although these theoretical approaches have different foci, two consistent themes have emerged. First, that traditional modernist and reductionist approaches are not appropriate modes of study for the social sciences. Second, while all post-modern approaches hold there is no single 'Grand Theory' for all contexts, there is a growing recognition of the need for a 'converging explanatory framework' to help create a greater degree of unity for the study of the social sciences (Lewis, 2000; Morrison, 2003). This is where complexity theory, and its associated theories, has emerged as a potential unifying catalyst. In fact, it has been suggested complexity theories is an umbrella term for principles and concepts from a range of theories that include chaos theory, dissipative structures theory, the theory of complex adaptive systems, dynamical systems, situated perspectives and ecological theory (Burnes, 2005).

Although notions of the world as an evolving complex system go back to antiquity, it has only been since the 1940s that a theory of complexity has been developed within the natural sciences. Formative studies took place within systems theory (how whole systems change over time) and morphogenesis (the evolution of form from chaos), and since then a range of sciences and, more recently, social sciences have started to investigate the possibilities of complexity theory. Consequently, as can be seen in Table 3.1, by the mid 1980s a shifting worldview indicated a move from the traditional modernist perspective of simplicity, certainty and hierarchies to those of complexity, unpredictability and heterarchical relationships (Schwartz & Ogilvie, 1979).

Table 3.1 The Components of Traditional and Contemporary Worldviews

Traditional Worldview	Contemporary Worldview
• Simple probabilities • Hierarchical order • Mechanistic universe • Determinate • Direct causal relationships • Assembly of small parts • Assumption of pure objectivity	• Complex systems • Heterarchical order • Holographic/knowledge embedded • Indeterminate • Complex mutual causality • Morphogenesis • Multiple perspectives of reality

Subsequently, over the last 20 years, complexity theories have started to be applied to social groupings (Radford, 2006) with initial links to educational change agendas being made in the late 1980s and early 1990s through the work of Lave (1988), Brown, Collins and Duguid (1989), Rogoff (1990), Lave and Wenger (1991) and

Fullan (1993). However, although complexity *'generated a certain amount of hype in the nineties'* (Cilliers, 2010, p. vii), it has only recently started to have a more significant influence on educational thinking (Davis & Sumara, 2006; Mason, 2008; Morrison, 2010; Osteburg & Biesta, 2010). The attraction of complexity theory is that it offers teachers and groups of teachers the opportunity to more easily access and engage with 'change knowledge' because, *'instead of formulating rules for the whole population,* (it) *seeks to formulate rules of interaction for the individual entities making up a system or population'* (Burnes, 2005, p. 79). As such, Davis and Sumara (2001) highlight that although the 'health' of the collective is critical, complexity theory is not about privileging the group over the individual as '*the qualities, capacities and character of the complex system is actually dependent on (but not determined by) the specific qualities and characteristics of its subsystem'* (p. 88). From an educational change perspective, this sentiment links to Hargreaves' (2009) thinking when he said:

> *'The coming era of educational change needs to be an era of reduced commitments to grandiose designs and granular micromanagement of top down reform in favour of an age of innovation and inspiration in a post-materialist world where people are increasingly prepared to look to each other in building a more hopeful and innovative society together.'* (p. 98)

As such, to consolidate, extend and connect current 'change knowledge' with the more uncertain and unpredictable features of a complex society, the remainder of this chapter will be split into two sections: complex systems and their functioning, and a complex ecological framework to curriculum innovation. The chapter will conclude

by presenting the key questions addressed by the thesis and the data sources being deployed in the chapters that follow.

3.3 Complex Systems and Their Functioning

This section presents a view of complexity informed by the *'central founding tenets and elements'* that emerged during the 1990s and that focus on *'change, evolution and adaptation through a combination of cooperation, competition and co-evolution of the organism with its environment'* (Morrison, 2010, p. 376). This view resonates with much of the contemporary 'change knowledge' discussed in the previous chapter and acts as the basis for the complex ecological approach to curriculum innovation that follows. However, whilst this view is supported by much of the literature, the embryonic nature of complexity theory means that this is only one of several interpretations (Edmonds, 1999; Manson, 2001) and, in common with emergent theories, many of the principles, applications and methodologies are still being clarified (Morrison, 2010). It is, however, not the intention of this thesis to critique all accounts of complexity, but to present a version that is based on these central tenets and elements.

Understanding Complex Systems

Complex systems are best understood by considering the difference between complicated (or closed) and complex systems (Prigogine, 1976) with '*the distinction between what is complicated ...and what is complex...is paramount'* (Osberg, Doll & Trueit, 2009, p. vi) (see Figure 3.1).

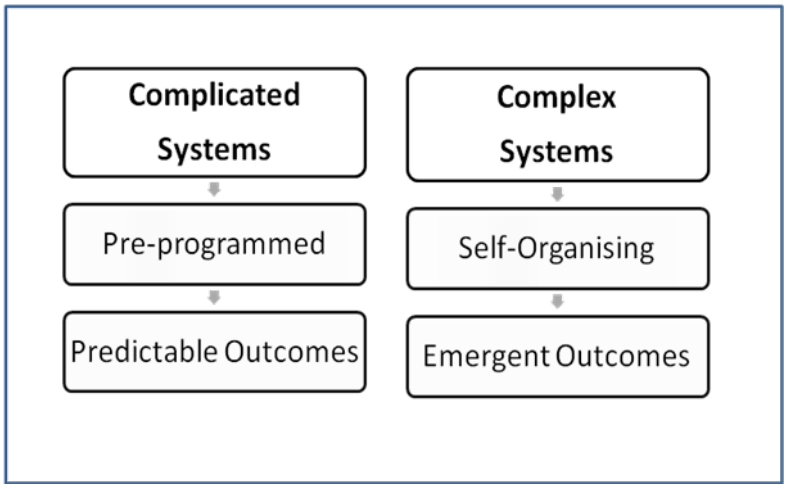

Figure 3.1 Complicated and Complex Systems

Complicated systems are pre-programmed structures that are made up of elements that interact in a linear closed-loop manner, are governed by the laws of cause and effect, and guarantee predictable outcomes. There are many examples of complicated systems in everyday life, including watches, cars and televisions. Complex systems, of which humans are an example, are different because they do not have this inbuilt pre-programmed arrangement. The elements of a complex system self-organise by interacting with each other within their own structure and also with the external environment (Prigogine, 1976). Further, the flexibility of these '*rich interactions*' (Cilliers, 1998) leads to unpredictable or emergent outcomes that enable complex systems to adapt and develop in response to the ever-changing demands of the environment (Morrison, 2003), something complicated systems are unable to do. These self-organising and emergent concepts are the major difference between complex and complicated systems and have resulted in complexity theory being alternately termed *'a science of emergence'* (Waldrop, 1993, p. 88) or the *'study of self-organizing systems'* (Doll, 2008, p. 203). Consequently, whereas complicated systems are stable, closed-loop entities, complex systems are *'inherently*

dynamic and transformational' (Byrne, 1998, p. 51), unstable (or at the edge of chaos), open-ended and non-linear in their functioning (see Table 3.2).

Table 3.2 Differences between Complicated and Complex Systems

Complicated Systems	Complex Systems
• Pre-programmed • Predictable • Closed • No mutual relationship with its environment • Stable • Linear	• Self-organising • Unpredictable/Emergent • Open-ended • Reciprocal relationship with its environment • Edge of Chaos • Non-linear

These differences between complicated and complex systems raise important questions about the traditional top-down approach to change based on notions of certainty. In particular, given the recent shift in educational change thinking, it has been suggested that more attention should be given to bottom-up, self-organising and interactive approaches that acknowledge outcomes as more unexpected and probabilistic than certain (Biesta, 2010). This point is particularly significant because complexity does not reject notions of structure and order, but views these concepts through a different self-organising and emergent lens. As Biesta (2008) contends, complexity *'can help us to understand order, structure, regularity, causality and permanence differently'*, but *'provides us with a different understanding of those aspects of the physical and social world that are or appear to be not complex'* (p. 1). A compelling interest for complexity scholars is to explain

how complex systems are able to balance or harmonise (Davis & Sumara, 2006) the differences between uncertainty and unpredictability whilst, at the same time, being able to *'achieve their integrity and maintain it over time' (*Biesta, 2010, p. 5). While modernist approaches present a centrally-driven, linear approach focussed on predictable outcomes, complexity proposes that we need to better understand the self-organisation process as the key to influencing change (Morrison, 2010).

The following characteristics are presented to highlight the key features of self-organising complexity (see Table 3.3):

Table 3.3 Key Features of Self Organising Complex Systems

- Not about 'anything goes'
- Ambiguously Bounded
- Operate at the Edge of Chaos
- Often governed by 'Order Generating Rules (ORGs)'
- Self-Determining
- Connected and Nested
- Rely on Feedback
- May be 'natural' but not necessarily 'good'

Self-Organising Systems are Not About 'Anything Goes'

Unlike complicated systems, complex systems have the capacity to self-organise (Morrison, 2010) or free-think (Stacey, 1996), and have the potential to interpret different events in different ways and adapt their responses. Therefore, when complicated systems are disturbed the response is consistent, whereas responses from

complex systems will be unpredictable. However, this self-organisation process does not imply 'anything goes'. In fact, Haggis (2008) has noted that a complex system,

> *'though unpredictable, is nonetheless also constrained: by features that are both internal (in terms of initial conditions and interaction histories) and external (in the sense that the system is partly made up of the interactions of larger systems, and also in the more conventional sense of physical, 'environmental' factors) to the system which is the focus of study.'* (p. 174)

As a result, complex systems, over time '*generally come to resemble less open systems i.e. fewer possible connections between inputs and outputs, between actions and consequences and where, as a result, regularity and structure begin to emerge' (*Biesta, 2008, p. 8). While self-organisation has the potential to result in multiple responses, this rarely happens, as many internal and external factors limit, constrain or bound the range of likely responses. Complex systems, therefore, are generally not random structures, but considerably less chaotic than may originally have been assumed.

Self-Organising Systems are Ambiguously Bounded

This limiting or constraining characteristic results in complex systems being *'ambiguously bounded'* to ensure they keep '*a delicate balance between sufficient coherence to orient agents' actions and sufficient randomness to allow for flexible and varied response*' (Davis & Sumara, 2006, p.148). As such, '*complex learning*

systems are neither entirely 'fixed nor chaotic' (Davis & Sumara, 2006, p. 149), but have structures that are regularly shifting and are *'continuously transformed through the interaction of the elements'* (Olsen, 2008, p. 107). This ambiguity, in part, is because complex systems share the same 'space' with other complex systems which means each discrete complex system must be able to shift its boundaries to accommodate the wider complex community. School education is an example of an 'ambiguously bounded' system in that the school as a complex system is constrained or bounded by many factors, for example: school buildings, the ages, days and times children attend schools, school timetables, defined curriculum and assessments, and a host of other constraining factors (Biesta, 2010). However, all schools are not the same, and are often very different, because the external communities in which they are situated and the teachers and children who populate them are, as complex systems, different. Therefore, while schools usually have consistent characteristics that define them as schools, they also have different internal structures and development trajectories. These differences are particularly noticeable when schools respond to ever-changing local and national events (e.g. parental involvement or government policies). The self-organising capacities of the school alongside these changing contextual factors result in the boundaries in which the school functions constantly changing and creating systems that are 'ambiguously bounded'.

Self-Organising Systems Operate at the Edge of Chaos

One consequence of complex systems being '*ambiguously bounded'* and '*neither entirely 'fixed nor chaotic*' (Davis & Sumara, 2006, p.149) is that they are not stable entities, but constantly on the edge of chaos. Although the edge of chaos has undertones of danger and mishap, it is quite the opposite. Stacey (2003) describes

the edge of chaos by considering the difference between three different types of order-disorder that take place within ambiguously bounded complex systems (see Figure 3.2). First, he notes how complex systems with stable equilibrium stay in a similar state for some time and subsequently find it increasingly difficult to adapt to change which ultimately leads to their demise. He uses the example of the butterfly that only flies in a straight line and thus becomes an easy target for predators. Schools, teachers and lecturers who become locked into one way of working have similar problems. Morrison (2003) calls this stable equilibrium *'the stability of the mortuary'* (p. 285). At the opposite end of the continuum, Stacey (2003) talks of complex systems with explosive instability**:** systems in a very unpredictable, random or volatile state that become very unstable and eventually destroy themselves (e.g. cancer). The third category of order-disorder is bounded instability in which the complex system is somewhere between absolute chaos and stability and are, thus, on the edge of chaos. Bak (1996) suggests that this is between mechanistic predictability and complete unpredictability and terms it '*self-organised criticality*' (Bak, 1996).

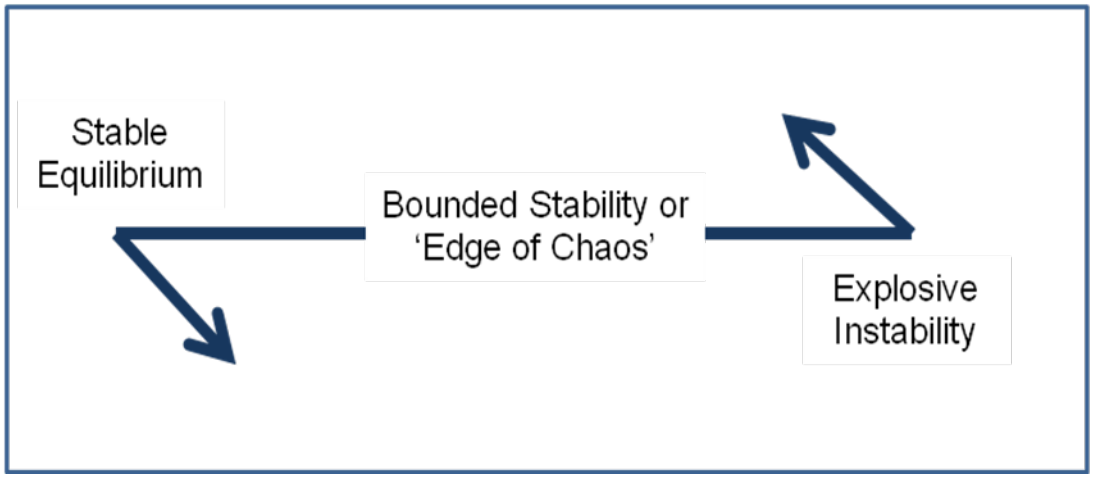

Figure 3.2 Edge of Chaos within Three Different Types of Order-Disorder within Complex Systems (from Stacey, 2003)

From a change perspective, complex systems in this in-between state are *'constantly poised between order and disorder* (and) *exhibit the most prolific, complex and continuous change'* (Brown & Eisenhard, 1997, p. 29). Many elements keep changing so that stability is not an option and the more the system moves towards the edge of chaos, the more likely that behaviours, ideas and practices will be '*creative, open-ended, imaginative, diverse and rich'* (Morrison, 2003, p. 286). Prigogine (1997) contends that these rich behaviours emerge because *'bifurcation points'* appear at the edge of chaos when the system must choose between several equally satisfactory options, with the result that the apparent order and trajectory of the system changes relatively quickly and unpredictably. As a consequence, *'creativity and growth are at their optimal when a complex system operates at the edge of chaos'* (Burnes, 2004, p. 315). In addition, Morrison (2003) contends that these edge of chaos experiences result in greater '*connectivity, network and information sharing between participants*' (p. 286).

Therefore, unlike a closed, complicated system, the ambiguous boundaries of the complex system facilitate moves towards the edge of chaos which create rich contexts for experimentation and learning. Educationally, this edge of chaos concept challenges existing notions of linear learning and behaviourist pedagogy in terms of children's and teachers' learning. Subsequently, non-linear approaches to pedagogy (Dalke, Cassidy, Grobstein & Blank, 2007), management (Davis & Sumara, 2006) and professional learning (Atencio, Jess & Dewar, in press) are now beginning to appear in the educational literature.

Self-Organisation is Often Governed by Order Generating Rules (OGRs)

The notion of OGRs is based on the observation that *'in an astonishing variety of contexts, apparently complex structures or behaviours emerge from systems characterised by very simple rules*' (Gell-Mann, 1994, p. 10). Although complex systems may be unpredictable, emerging order often appears to be governed by a small number of simple rules (Tetenbaum, 1998; Black, 2000; MacIntosh & MacLean, 2001). One example is Reynold's (1986) 'Boids' (birds) study in which three ORGs show how 'computer-generated boids' fly (on the screen) as an apparently ordered flock. Reynold's three OGRs were that 'Boids' fly at roughly the same speed, close to each other but not touching and in the same direction. Burnes (2004) suggests it is these few simple ORGs that enable the self-organisation which allows some complex systems to remain at the edge of chaos whereas others fall away. Consequently, emergent behaviour is the appearance of more complex behaviours from bottom-up processes based on local rules and behaviours of individual elements. OGRs permit limited chaos whilst providing relative order (Reynolds, 1987; Frederick, 1998), although given the unpredictable nature of complex systems, *'self-organisation may not occur even when appropriate order-generating rules are present'* (Burnes, 2004, p. 317). However, Burnes (2004) also suggests that ORGs have a significant role to play in the framing of complex systems as they '*create the conditions for self-organisation, and self-organisation creates conditions which enable order-generating rules to be transformed'* (p. 318) and '*have the potential to overcome the limitations of rational, linear, top-down, strategy-driven approaches to change'* (p. 317).

While the specific notion of OGRs is yet to appear in the education literature, having been mostly used in the management and organisational literature (Burnes, 2004; Livne-Tarandach & Bartunek, 2009), the idea of simple skills underpinning more complex behaviours is common throughout much curriculum development in practice. For example, key skills (Hodgson & Spours, 2002), core skills (Canning, 2007), core learning (Tomlinson, 2004) and learning in the developmental domains (Bloom, 1956; Harrow, 1972; Krathwohl, Bloom & Masia, 1973) are all examples of generic knowledge, skills and competencies that connect with the notion of ORGs. In PE, as will be discussed later, the idea of a relatively small number of basic or fundamental movements underpinning the more complex physical activities children engage with as they get older has received considerable support over many years (Gallahue, 1987; Graham, Holt-Hale & Parker, 1993; Jess & Collins, 2003; Scottish Executive, 2004b). As such, the notion of a small number of core skills being central to engagement in the change process appears to resonate with the OGR concept.

Self-Organising Systems are Self-Determining

Although the complex system will be influenced by the context in which it functions, and may be bypassed in extreme circumstances (e.g. in a natural disaster), it is ultimately the complex system itself that *'determines how it will respond to emergent conditions'* (Davis & Sumara, 2006, p. 99). Therefore, the capacity of the system to '*respond creatively to emergent circumstances is dependent on its own internal identity*' (Davis & Sumara, 2001, p). For example, as complex learning systems, teachers constantly change in response to emergent experiences which impact on

their knowledge, understanding and emotions. Different teachers respond differently to the same stimulus, which means generalising results from one complex system to another is problematic. In fact, this self-determining characteristic can lead to the same teacher responding differently to a similar situation, even over a very short period of time.

Self-Organising Systems are Connected and Nested

Connections are at the heart of complex self-organising systems because '*new properties and behaviours emerge not only from the elements that constitute a system, but from the myriad connections among them'* (Mason, 2008, p. 48). Complexity is less conducive to notions of top-down control because '*the phenomenon of self-organisation... can happen without the assistance of a central organiser' (*Davis & Sumara, 2006, p. 84*).* As Horn (2008) suggests, '*in the absence of external controls, conditions may be established that greatly enhance the likelihood for the emergence of communicative behaviours that are self-organizing and adaptive'* (p. 139). Information, therefore, is not seen as a centrally held commodity 'owned' by a limited number of individuals, but distributed, shared and circulated throughout the system (Morrison, 2003). Cohen, Mannion and Morrison, (2008) have noted that, '*an essential requirement is effective communication and collaborative learning. Communication and collaboration are key variables'* (p. 1).

This notion of connectedness is further developed by a key tenet of complexity: nesting or nestedness. Nesting highlights how, like a Russian doll, complex systems are '*simultaneously a unity, a collection of unities and a component of a greater unity'* (Davis & Sumara, 2001, p. 85). Complex systems, therefore, function at many

different levels, as many smaller complex systems merge to create larger and even more complex systems. In addition, as each complex system modifies, new behaviours emerge and influence other complex systems. Although these modifications primarily influence the systems in closest proximity, the connected nature of the nested system creates a 'ripple effect' as the interaction of the smaller complex system (e.g. the individual), feeds into the larger and more complex system (i.e. the wider society), which in turn exerts influence back into the individual units of the network (Morrison, 2003). Central to the effectiveness of this nesting process is the need for interconnectedness and on-going communication within and between the levels of the system.

Nesting is apparent in all complex systems (e.g. cells, body organs, social groups, societies). For example, the human body is made up of the interaction between the brain, heart and other organs, with, one level down the nest, the neurons in the brain are nested into mini-columns, macro-columns, cortical areas and cerebral hemispheres (Calvin, 1996). Davis and Sumara (2006) discuss the nested nature of knowledge through four interrelated nested levels (see Figure 3.3). They identify two 'categories of knowing' which, at the more immediate level, involve subjective understanding and the classroom collective, both of which are dynamic, volatile and can change in short periods of time. This dynamic knowledge is 'nested' within two 'categories of knowledge': the curriculum structures and the disciplinary knowledge, both of which are more stable, and often unquestioned, as change in these categories tends to take many years to come about. This means there are at least two layers of nested organisation between the objective disciplinary knowledge and subjective understanding, i.e. the ever-evolving curriculum and the classroom context.

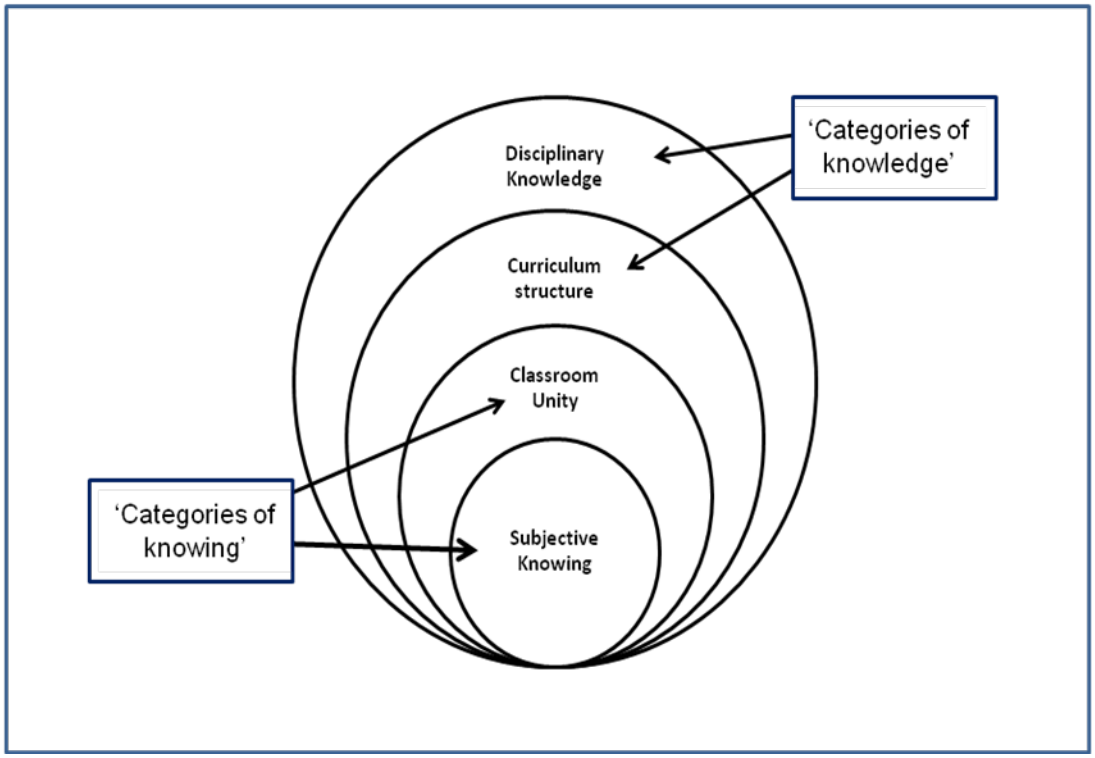

Figure 3.3 Knowing and Knowledge from a Nested Perspective (adapted from Davis & Sumara, 2006)

Nesting also extends into social structures where '*human collectives run into a ceiling of 150 people, at which point subdivision becomes necessary or a new level of organisation emerges*' (Aiello & Dunbar, 1993). Again, new behaviours emerge and new rules arise at each emergent level requiring adaptation in behaviour. Nestedness, in the context of educational change, moves beyond the tri-level development of school, district and state (Barber & Fullan, 2005) to include the direct influences of the individual, class and school contexts with the more indirect influences of the local, national and global contexts (see Figure 3.4).

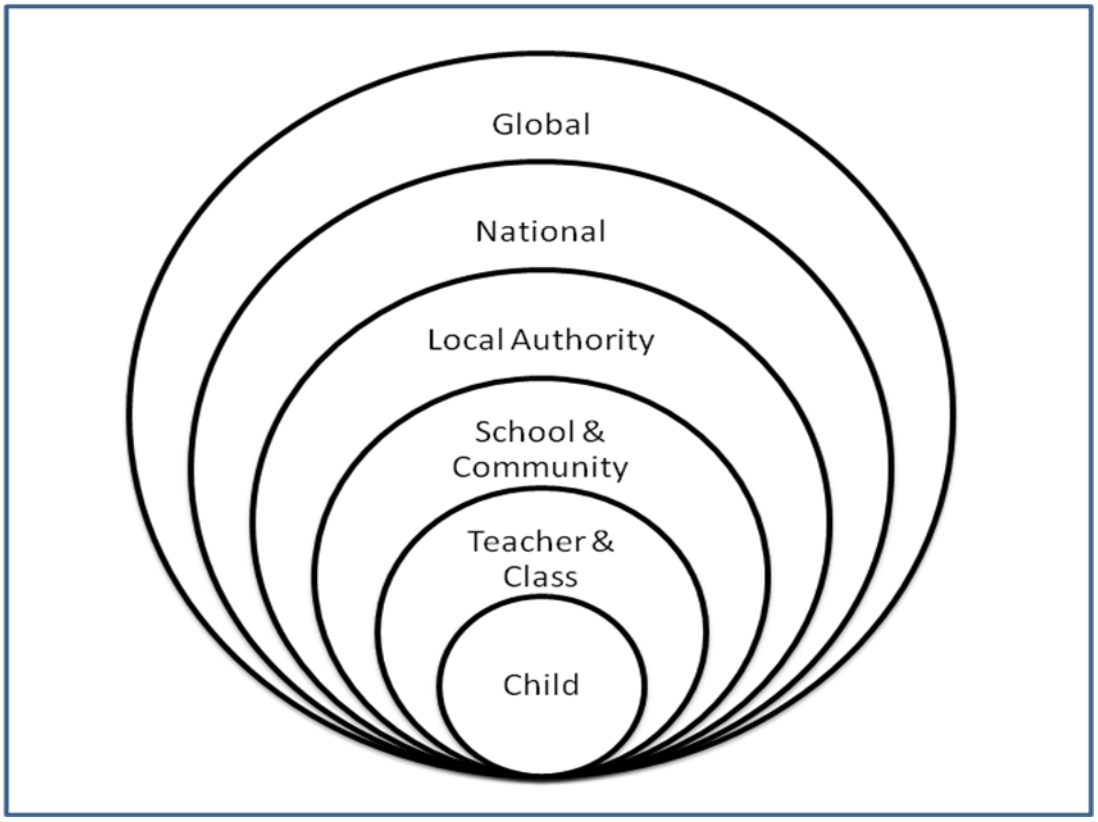

Figure 3.4 The Education Context from a Nested Perspective

The individual in this nested context '*emerges from the dynamic interactions of the elements of the webs that he/she inhabits. The individual, the group, the class, the school, the community are all inter-related and affect each other; they are neither isolated nor independent*' (Morrison, 2008, p. 27). Morrison further argues that *'Individuals, families, students, classes, schools, communities and societies exist in symbiosis; complexity theory tells us that their relationships are necessary, not contingent, and analytic, not synthetic'* (p. 28-29). Nestedness, therefore, presents important implications for the work environment which, although it has always been made up of small groups within larger groups, has functioned in a traditional management (and teaching) perspective in which interactions tend to be based on

linear top-down power and control mechanisms with limited consideration given to structures that focus on connectivity within and beyond the immediate context.

Connectedness and nestedness are linked with notions of situated learning and social constructivism, and highlight the importance of collaboration in local settings and across the different sectors of the system. As such, complexity thinking connects to existing collaborative educational 'change knowledge' and offers strong support for learning environments that are more collaborative with new knowledge not only shared, but created as groups come together to develop shared visions and collective mastery. However, nestedness also offers the potential for a more comprehensive conceptual and connected framework in which teachers and children, learning experiences and learning contexts are not only seen as nested systems in their own right, but as a complex connected phenomenon with a myriad of possible interactions. Therefore, nestedness creates a 'shifting' structure which offers the opportunity to investigate 'filling in the blanks' that arise between the intermediary levels of social organisation between self and society which are often perceived as the '*bookends of educational discourse'* (Davis & Sumara, 2006).

Self-Organising Systems Rely on Feedback

Feedback is central to self-organisation (Carver & Sheier, 1998). It occurs between the interacting elements of the system, is an ongoing feature of the self-organising process and takes many different forms (Brookhart, 2008). For example, Cohen et al., (2008), from a complexity perspective, highlight the important differences between negative and positive feedback. Negative feedback – for example, failing an exam or getting a punishment – is used for regulatory purposes and brings diminishing returns in terms of change or development (Marion, 1999). In a sense,

negative feedback attempts to keep the system closed and 'in check'. Positive feedback, on the other hand, uses information to support change, growth and development (Wheatley, 1999). It brings increasing returns because it amplifies small changes (Stacey, 1992) and opens up the system (e.g. once a child gets something correct, he/she may approach things with more enthusiasm and move forward quickly). However, positive feedback can also have deleterious effects when, for example, it triggers a mass uptake of a product and the system breaks down because it is unable to cope with the demand. For this reason, Senge (1990) suggested positive feedback should be called self-fulfilling feedback. However, in terms of the ambiguous bounding highlighted earlier, both negative and positive feedback are important features in balancing or harmonising the complex system.

Self-Organisation may be 'Natural' but it is not necessarily 'Good'

Finally, although complex systems self-organise, it would be wrong to assume that all self-organisation is positive and focussed on progress, development or moral purpose. The 'natural' course of action may, in fact, be to retain the 'status quo' because change will lead to anxiety or, as in the case of the 'indigenous experts', a loss of power or expert status. In addition, Lichtenstein (2000) suggests '*not all self-organizing is successful'*, in that it may lead to '*inefficiency, time-wasting, mob rule, and people going in so many different directions that connectivity and alignment between parts of an organization, its values and direction, are lost*' (p. 538). Further, Smith and Humphries (2004) suggest that when left to self-organise rather than being managed or controlled, individuals or groups may be unreliable, selfish and irrational. Also, some self-organising may be unsafe (e.g. children 'experimenting' with fire or glass) and control may be necessary in other situations

like the military or prisons (Solow & Szmerekesovsky, 2000; Parellada, 2007). Therefore, while complex systems naturally self-organise and may produce expected outcomes in certain situations, it is important to recognise that these outcomes will not appear with absolute certainty on every occasion. Self-organisation is not pre-determined, but probabilistic (Biesta, 2010).

Section Summary

This section has presented the key tenets from complexity theory that connects with much of the 'change knowledge' discussed in the previous chapter and acts as the basis for the complex ecological approach to curriculum innovation that follows. Central to this complex view is that complex systems are different from complicated systems because, as opposed to being pre-programmed and certain, they are self-organising and emergent. However, although unpredictable, this self-organising process is not about 'anything goes' because complex systems are ambiguously bounded by many evolving internal and external elements. Over time, the nature of this ambiguous bounding of the complex system is influenced by a range of complexity features that include edge of chaos, order generating rules, self-determination, connectedness, nestedness and feedback. Although some of these tenets are part of more traditional linear approaches, complexity offers a different lens through which to view notions of order and unpredictability. However, because of its relative infancy, there are currently few examples of complexity principles being applied in practice (e.g. Davis & Sumara, 2006) and, given the dominance of top-down and linear change models over the last 30 years, it will likely be some time before complexity-oriented approaches influence practice on a large scale (Morrison, 2010). The next section seeks to present a complex ecological approach (CEA) that

not only synthesises complexity tenets and 'change knowledge', but also sets out to help teachers and other educators develop the capacity to cope with, negotiate and influence the curriculum innovation process.

3.4 The Complex Ecological Approach (CEA) to Curriculum Innovation

The relative infancy of complexity thinking in education means that attempts to apply complexity principles in practice have only recently started to emerge (e.g. Davis & Sumara, 2006). Subsequently, in an effort to contribute to this growing body of literature, this next section presents a CEA to curriculum innovation in an effort to synthesise key features from the complexity, ecological and 'change knowledge' literature discussed earlier. However, before discussing this approach in detail, based on the key principles already discussed, the following CEA principles are presented:

1 The learning process is a 'natural' self-organising phenomenon that produces emergent and unpredictable behaviours and, not pre-programmed outcomes with a degree of certainty.
2 By itself, self-organisation does not necessarily lead to desirable or appropriate outcomes.
3 From a learning perspective, self-organisation is best when occurring in a social context, preferably under guidance.
4 Guidance is best when focussed on the support of self-organising learning, although there are times when a top-down, linear and content specific teaching approach may be appropriate.

To accommodate these principles and features, the CEA is presented as an interrelated process which revolves around the context in which the teaching is

taking place, the capacities of the teacher and the teaching efforts being 'delivered' (see Figure 1.1 on page 10). As such, it is proposed that if teachers have a good understanding of the context in which they are working and have developed the appropriate capacities to engage effectively in the curriculum process, they will be more likely to design and deliver curriculum efforts that relate to the self-organising and emergent principles. Subsequently, the remainder of this section will consider how the complexity, ecological and 'change knowledge' features are synthesised within this complex ecological frame.

3.5 The Context

To create appropriate curriculum opportunities for children, the CEA proposes that teachers must have a good understanding of the context in which children are learning. One of the many ways to develop an understanding of the context is from an ecological perspective (Gibson, 1978/86; Bronfenbrenner, 1979; Newell, 1986; Rogoff, 1990; Rovegno & Dolly, 2006), in which the context is defined as the on-going interaction between three key factors: individual, task and environment, which are (see Figure 3.5):

The Individual: The children involved in the learning process

The Task: The activities being attempted

The Environment: The place in which the individuals are attempting the task

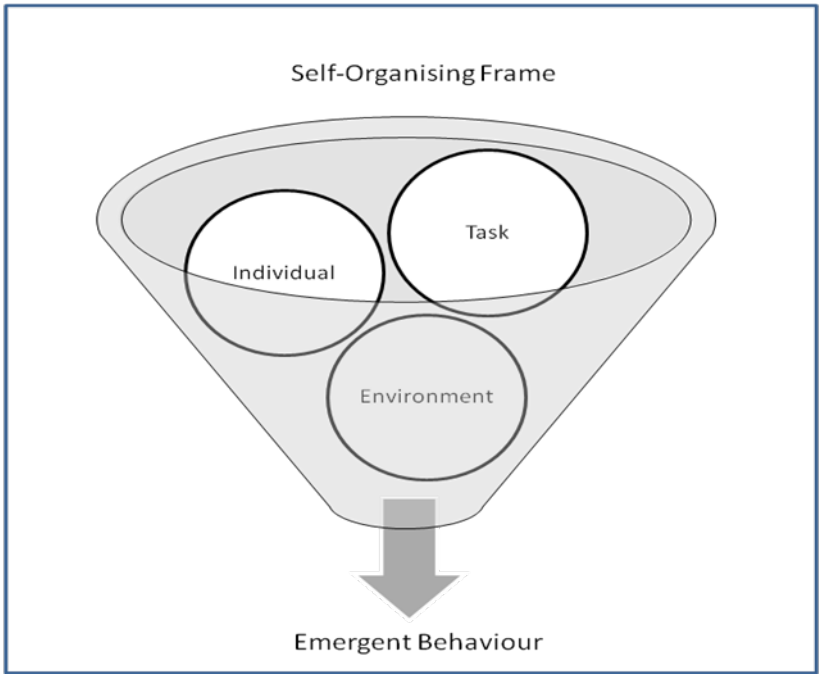

Figure 3.5 The Interacting Components of the Ecological Context

Much of this ecological thinking has been influenced by Gibson (1978/86), whose work was based on the belief that the environment and individual cannot be defined without each other. Gibson described the basis of this mutual relationship through the concept of 'affordances': '*the possible use, meaning or function of something in the environment in relation to the individual's capabilities, goals and intentions.' (*1986, p. 263*).* As such, he defined the environment in terms of what it functionally affords an individual engaged in a task (or activity). Further, the task itself is an essential element of this self-organising structure as it sets or constrains the parameters of the individual's goals (Newell, 1986; Rogoff, 1990). Consequently, individuals need to attend to the environment in relation to their goals, intentions and capabilities for engaging in the task at hand (Gibson, 1978/86). Emerging behaviour cannot be described independently of the individual's goals, intentions and capabilities in relation to the task and the task's constraints. From an ecological

perspective, therefore, emergent behaviour is the outcome of an evolving self-organising relationship between the individual, task and environment. While Gibson's work primarily focused on the more immediate environment in which individuals function, more socially-oriented ecologists extended the range of his ecological analysis to cover the different nested layers of the micro, meso and macro environment (Bronfenbrenner, 1982; Rogoff, 1990), highlighting the 'ripple' effect in which these different layers influence the other layers across the system.

As such, it is proposed that if teachers are to create appropriate curriculum experiences for children, they not only need to understand the children who are the target of the learning experiences, but also the immediate and nested environments in which they are working and the actual curriculum content that is the focus of the learning. Without a good understanding of these ecological factors, teachers' curriculum efforts will often become 'pot luck' in terms of the appropriateness of tasks or learning experiences for the children in the immediate environment. However, as will now be discussed, whilst an understanding of the ecological context plays a role in framing an appropriate curriculum innovation, by itself, this is not sufficient to apply the curriculum in practice.

3.6 The Capacities

While teachers need to understand the context in which they are working, the CEA also proposes that they must develop the appropriate capacities to not only make sense of their work context, but develop, deliver and assess appropriate learning experiences. Developing capacities is no 'quick fix' and there is an urgent need for teachers to be able to identify and develop those capacities that are central to the curriculum process. This is particularly important for teachers involved in the

curriculum innovation process as there is a widely-held assumption that '*lack of capacity is the initial problem'* (Fullan, 2007, p. 44). However, although many of the capacities needed to support teachers' curriculum efforts have been identified in the 'change knowledge' literature (e.g. Fullan, 2004), as has already been noted, these capacities have usually been presented in disconnected lists which lack the conceptual integration to blend their commonalities and makes them easier to apply (Lakoff, 1987; Morrison, 2003). Therefore, by grouping these capacities on the basis of self-organising principles, the CEA has created two interrelated capacity categories which help give the curriculum innovation process its focus and direction on the one hand, and its internal and external cohesion on the other. These categories are (see Figure 3.6):

Directional Capacities which help give the innovation its focus and guide the trajectory of the innovation process. These include vision, inquiry, reflection and emotions.

Integrating Capacities which help sustain the coherence of the innovation and the innovation process. These include knowledge and relationships.

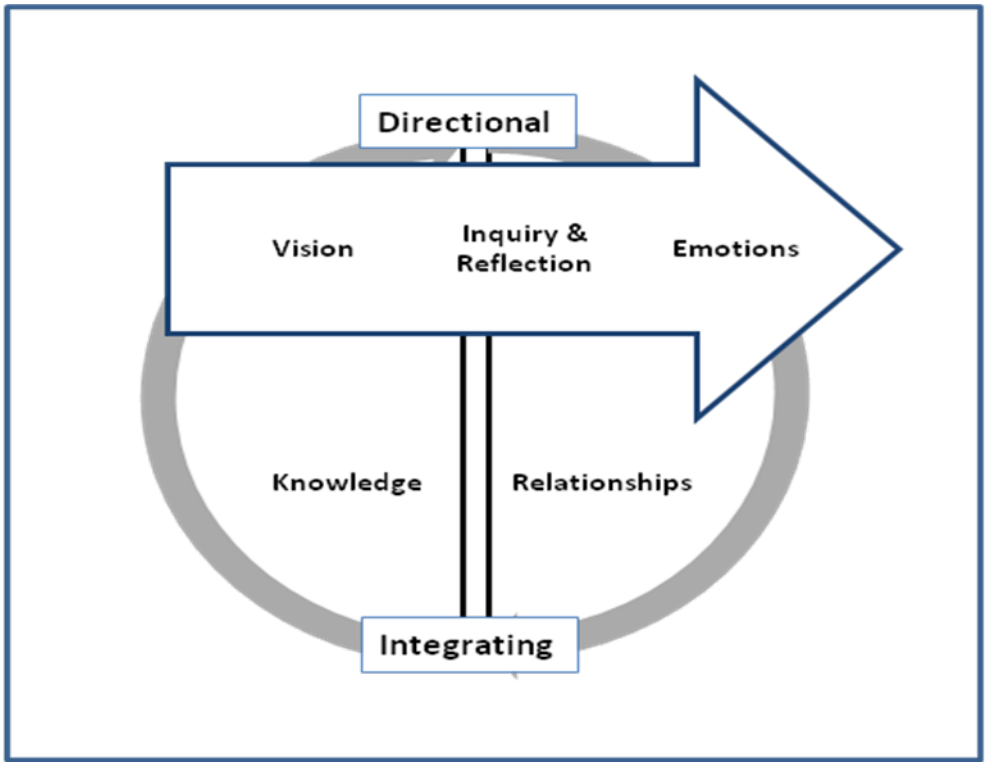

Figure 3.6 The Interacting Complex Ecological Capacities

Directional Capacities

Directional capacities initiate and sustain the focus and trajectory of the curriculum efforts and fall into three interrelated sub-categories, as follows:

1. **Vision**

The evolving vision for the curriculum innovation (Fullan, 1993), often a moral purpose, sets the parameters for the innovation and is part of the 'ambiguous bounding' of the curriculum innovation efforts.

2. **Inquiry and Reflection**

Inquiry and reflection skills help sustain the on-going development and adaptability of the curriculum innovation process (Fullan, 1993; Schon, 1987; Pollard et al., 2005). These key process capacities enable teachers to keep innovations 'on track' by building an appropriate knowledge base, sustaining connections and responding to feedback. However, these capacities can also help teachers make 'bifurcation' decisions that change the direction of innovation efforts when deemed appropriate (Biesta, 2008).

3. **Emotions**

While emotional skills are often marginalised in the educational change literature they not only help initiate the curriculum efforts but are a significant component of the reflective process which sustains the development and trajectory of the innovation efforts (Hargreaves, 2005).

These three directional capacities were discussed in more detail in Chapter Two and, as such, have only been highlighted here.

Integrating Capacities

Teachers' integrating capacities are critical to the long term success of any curriculum innovation effort as they help maintain the coherence of the innovation project over time, i.e. they are a career-long endeavour. Without these integrating capacities teachers' efforts have the potential to become 'stand alone', 'siloed' or isolated efforts that create disconnected and de-contextualised learning experiences (Lave & Wenger, 1991). Conversely, without integrating capacities, curriculum innovation efforts may also become too wide and overly-ambitious as attempts are

made to include everything, with the result that too many connections to other curriculum areas and outside agencies are attempted. Too much information is available and the learning experiences become transient and shallow, as too little time is spent engaging with important core information. Integrating capacities help ensure that a curriculum innovation is not only internally connected within its own ambiguously bounded structure, but connects laterally across and beyond the immediate context, and also with the wider nested system (see Figure 3.7). For example, in the 'siloed' curriculum instance, integrating capacities will help connect the innovation with other curriculum areas or outside agencies, whereas in the overly-ambitious curriculum example, integrating capacities help reduce the complexity (Biesta, 2010) that stems from too much information being available. Integrating capacities therefore connect a curriculum innovation latterly across the school curriculum and also to the 'real life' context beyond the school. In addition, integrating capacities ensure the curriculum innovation connects to the broader meso and macro contexts which, in the nested manner discussed earlier, influence events at the immediate context.

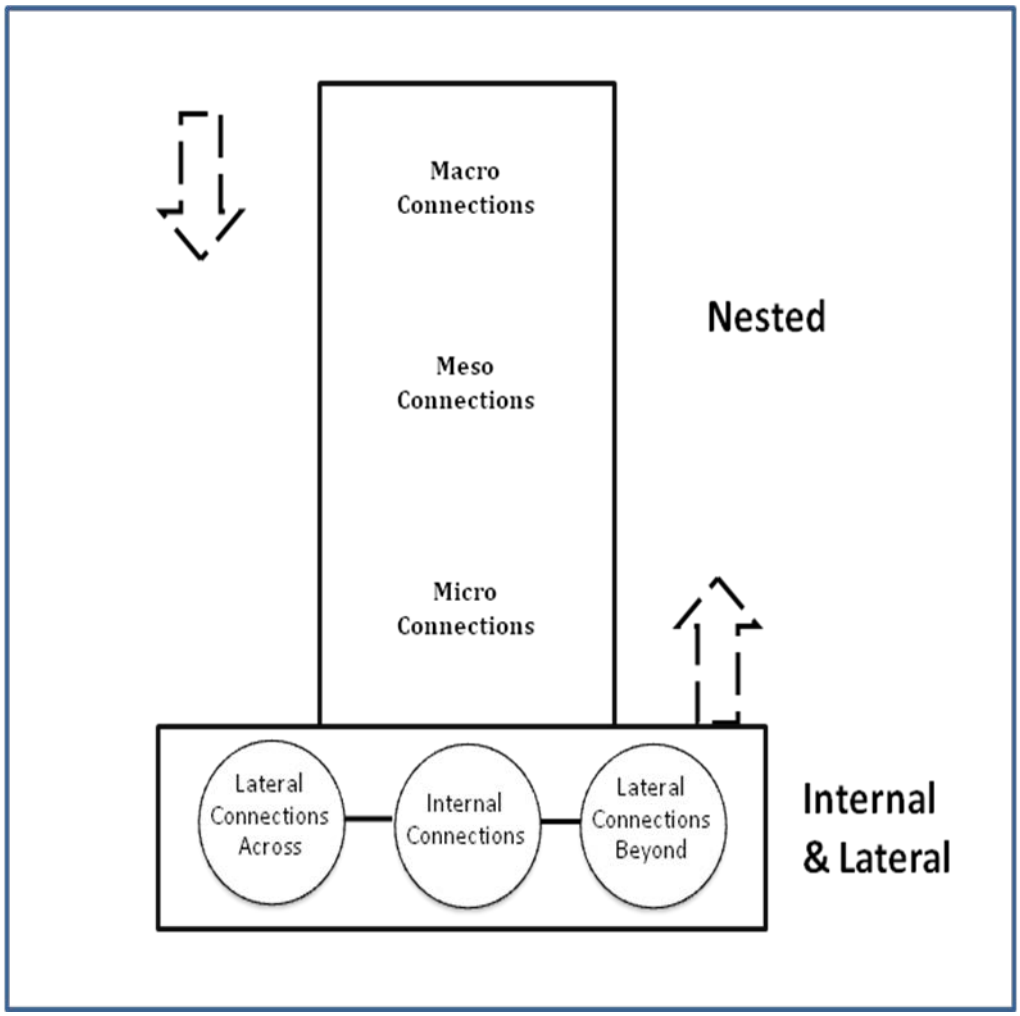

Figure 3.7 Integrating Capacities: Internal, Lateral and Nested

The CEA proposes that two integrating capacities are key to creating and sustaining long term coherent innovations: knowledge and relationships (see Table 3.4).

Table 3.4 Integrating Capacities: Internal, Lateral and Nested

Integrating Capacity	Knowledge & Understanding		Relationships (Developing relationships...)
	Innovation (Knowing about....)	**Process** (How to develop....?)	
Internal	The specific innovation	Specific innovation knowledge and immediate relationships	With the immediate individuals
Lateral (across)	Innovation knowledge integrated with interdisciplinary knowledge	Interdisciplinary innovation knowledge and relationships across the immediate innovation context	Across the immediate innovation context
Lateral (beyond)	Innovation knowledge linked to authentic 'real life' knowledge	Authentic innovation knowledge and relationships beyond the immediate innovation context	Beyond the immediate innovation context
Nested	Innovation knowledge across the micro, meso and macro levels of the system (e.g. national guidance and global knowledge)	Knowledge across the micro, meso and macro levels of the system	Across the micro, meso and macro levels of the system

Knowledge

Teachers, through on on-going inquiry process, need to concurrently develop two key knowledges. First, they need to build a coherent internal but nested knowledge base about the specific curriculum innovation that is the focus of their innovation efforts (Davis & Sumara, 2006). This involves an inquiry process that helps keep teachers up to date with the evolving curriculum knowledge base at the many nested levels of the system (i.e. national curriculum guidelines and global knowledge). However, from a connected perspective, teachers also need to extend this internal curriculum knowledge base latterly across the wider school curriculum (i.e.

interdisciplinary knowledge) and beyond the school curriculum (i.e. with the 'real' world) (Figure 3.8). Critically, it is unlikely teachers will be able to engage in this integrated experience effectively without working collaboratively with colleagues within, across and beyond their immediate setting. In addition, the second integrating knowledge base, as discussed earlier, is the teachers' 'change knowledge' on how to create curriculum innovations and how innovation processes are effectively operationalised.

Interpersonal Relationships

Although knowledge is an essential component of curriculum innovation, by itself it is not enough to ensure the dissemination of an innovation, i.e. the change process. For this to happen, the innovator must develop different relationships with the stakeholders who are part of the innovation process. In curriculum innovation terms, these relationships cover the nested levels of the system which include immediate internal relationships with pupils and colleagues and lateral relationships with individuals and groups across and beyond the school and with other individuals and groups at the nested levels of the education system (e.g. local authority managers, national officers and associations) (see Table 3.4). Consequently, given the current nature of the education system, teachers will have different roles in these different 'nested' relationships (e.g. as teacher with children, collaborator with colleagues and as recipient from various leaders or managers). Developing the capacity to cope with and influence these different relationships becomes a critical component in the development and dissemination of curriculum innovation efforts.

Section Summary

From the self-organising perspective of the CEA, this section has presented two interrelated capacity categories which aim to help teachers and other educators develop more cohesive curriculum innovation efforts. The directional capacities of vision, inquiry, reflection and emotions are those that give the curriculum innovation process its focus and direction while the integrating capacities include those knowledges and relationships that connect the curriculum innovation internally, laterally and across the nested levels of the system.

3.7 Curriculum Innovation Efforts

Teachers introduce curriculum innovation efforts into a context with the intention of bringing about change. However, from a complex ecological perspective, these curriculum initiatives are not set programmes to be delivered in a pre-programmed top-down and linear manner. Complex ecological curriculum efforts are self-organising phenomena that emerge from the ongoing interaction between the capacities of the teacher and the context into which the curriculum efforts are being introduced. In CEA terms, there is no 'set way' or 'quick fix' to curriculum innovation, because it is an organic, self-organising phenomenon that is ambiguously bounded and emerges and develops over time in a non-linear manner. Within this ambiguous bounding, curriculum innovation efforts are governed by a small number of order generating rules, are self-determining, have the opportunity to move towards the edge of chaos, are connected and nested and will rely on the nature of the feedback received over time (see Table 3.3). However, in the 'real world' of the school, while some curriculum efforts may be innovative, and respond to specific

situations, engage with new knowledge or introduce a more open-ended pedagogy, other curriculum efforts will retain the same content year on year and deliver it in a similar way, giving little consideration to the nature of the changing context. Many efforts will be a mixture of innovation and repetition. Therefore, although there are many broad similarities across Scottish schools (e.g. national curriculum guidance), different children will meet different content and engage with this content in different ways on a regular basis. Over time, it is likely that these different children will learn quite different things. Subsequently, the CEA proposes that for teachers to effectively influence the curriculum innovation process as a self-organising concept, they need, with some urgency, to engage cognitively and emotionally in a career-long professional learning exercise which focuses on:

1. Their understanding of the different contexts in which they work
2. The on-going development of those key capacities that help focus, guide and integrate their innovation efforts across an educational system.

Without this understanding of context and the capacities to influence the curriculum process, teachers collectively will find it increasingly difficult to ensure they are up to date with contemporary developments in curriculum innovation. Critically, as we move into an era in which teachers are being offered more autonomy over their curriculum efforts, it becomes increasingly important that they are able to demonstrate the capacity to effectively influence the curriculum process. If they are not able to do this, governments, as they did in the 1980s and 90s, may make the decision to return to a curriculum innovation system that is driven and controlled in a top-down manner from the centre.

3.8 Chapter Conclusion

This chapter has set out to build on the progress made by contemporary 'change knowledge' scholars by setting educational change within a more complex ecological perspective. Addressing a number of perceived limitations, the complex CEA has been presented in an effort to more readily and effectively help teachers cope with and influence the educational change process. Central to the CEA is the belief that, in a post-modern world, educational change is best viewed through a complexity lens based on notions of self-organisation and emergence, as opposed to the more traditional complicated or modernist view that considers change as pre-programmed, linear and certain. However, the CEA proposes that self-organisation is not an 'anything goes' phenomenon but, as a complex system, ambiguously bounded by the many internal and external elements that help maintain a balance between order and unpredictability. Accordingly, by synthesising complexity principles and key factors from 'change knowledge', the CEA proposes that, if teachers have a good understanding of the context in which they are teaching and seek to develop those capacities that support their engagement in the curriculum innovation process, then they will be more likely to design and deliver curriculum experiences that effectively connect with self-organising and emergent principles. In particular, the CEA proposes that teachers need, with some urgency, to engage in career-long professional learning experiences that will help them focus, guide and integrate their curriculum innovation efforts across the educational system. The CEA specifically sets out to help teachers and other educators better cope with and influence the curriculum innovation process.

On the basis of this complex ecological background, the remainder of this chapter will focus on the overall aim and research questions, the structure of the thesis and finally the data sources used to explore the research questions.

3.9 Structuring and Analysing the Thesis

The overall aim of the thesis is to explore the potential use of the complex ecological approach (CEA) to help teachers develop the capacity to cope with and influence the curriculum innovation process, particularly in the subject area of primary PE. The context for this exploration will be my personal curriculum, pedagogy and professional learning innovation efforts in primary PE covering a 24 year period from 1987 to 2011. Overall, these efforts will be termed the Developmental Physical Education Project (DPEP) and will be divided into two chronologically connected phases. The first from, 1987 to 2001, is the foundation phase, which has a focus on early years curriculum innovation at the immediate micro level. The second phase, from 2001 until 2011, is the delivery phase which has seen these efforts extend to cover a broader age range (3-14) and also create a professional learning programme which has involved on-going collaborative partnerships across the different levels of the education system.

To explore the potential usefulness of the complex ecological approach, the thesis will investigate a number of questions. The thesis will not consider all aspects of the CEA , but focus on those contextual factors and capacities that have most influenced these innovation efforts over this period. In addition, while elements of the CEA have influenced my curriculum innovation efforts since 2007, the CEA had no direct influence upon my efforts before then. As such, while my narrative between 1987

and 2007 will consider the potential usefulness of the CEA from a retrospective viewpoint, more recent efforts will connect more directly with the CEA.

Question 1

How have the different contexts in which I have worked influenced my developmental PE innovation efforts over this 24 year period? In particular, what has been the impact of key macro, meso and micro ecological factors at the different nested levels of the education system?

Question 2

How have my evolving personal capacities influenced my developmental PE innovation efforts? Specifically,

a) How have my directional capacities influenced the focus and trajectory of my innovation efforts?

b) How have my integrating capacities influenced the connected nature of the innovation efforts?

Question 3

What evidence is there to support the proposal that the nature of my innovation efforts over the lifespan of the DPEP has been complex? In particular, what evidence is there that these curriculum innovation efforts have been self-organising, emergent, non-linear, ambiguously bounded, connected and nested?

I have outlined these research questions above to highlight the ways in which data will be presented to engage with these lines of inquiry. I now provide a brief

description of the thesis structure to reflect my analysis, so as to then explicitly explain how they are underpinned by particular forms of data.

The thesis will be structured in two sections (See Table 1.1 in Chapter One for more detail). Section One contains three chapters which review the contemporary literature on educational change and complexity theory before presenting the key tenets of the CEA. To contextualise my personal narrative, the section will finish by reviewing the current curriculum innovation in PE. Section Two also contains three chapters and, from a CEA, explores the DPEP in two chronologically connected phases: the foundation phase between 1987 and 2001 and the delivery phase between 2001 and 2011. The final chapter of the thesis will consider the implications of the CEA for future curriculum innovation agendas.

3.10 Data Sources

Before investigating how my long-term developmental PE curriculum, pedagogy and professional learning innovation efforts can be effectively employed to explore the possibilities of the CEA, consideration of two key issues help frame this investigation: the data sources informing the exploration, and the status of curriculum innovation in PE. While the contemporary PE curriculum innovation literature will be discussed in the following chapter (Chapter Four), the data sources will be considered in this current section.

The DPEP case study (Chapters Five, Six and Seven) will be presented as a self-study that explores my curriculum, pedagogy and professional learning innovation efforts in primary PE over a 24 year period from 1987 to 2011. This self-study approach is used because it will help me look back and investigate my situated self

as if it were '*a text to be critically interrogated and interpreted within the broader social, political, and historical contexts that shape our thoughts and actions and constitute our world*' (Pithouse, Mitchell & Weber, 2009, p. 45). As such, this approach enables my investigation to be of '*one's self, one's actions, one's ideas, as well as the 'not self''* (Hamilton & Pinnegar, 1998, p. 236). However, the study is not an 'anything goes' narrative (Dhunpath, 2000) because it sets out to create a persuasive and inductive case for the CEA as a potential approach to the curriculum innovation process. By using personal and objective data to explore my professional and academic life as a teacher and lecturer with curriculum innovation aspirations, the DPEP chapters are an attempt to create a balanced, logical and insightful case to support the CEA. Consequently, the exploration will be framed by three ever-changing components; the context in which my innovation efforts have taken place, the key components of the CEA and my personal perception of the data or events that most appropriately serve the exploration. This framing is a kind of 'screening device' (Kirk, 1992a) through which I am able to 'identify with increasing accuracy and expertise what information is worthy of attention in any particular situation' (p. 217), particularly the issues I believe worthy of serious attention and 'the evidence I considered to be admissible in relation to these issues' (p. 217). In this task, I am particularly conscious that I am not simply trying to 'raid the past' (Young, 1975) to support and legitimise the potential of the CEA, but to construct a balanced and reasoned argument for the CEA approach, based on personal recollections that are plausible, ring true and enable connection (Bullough & Pinnegar, 2001). My intention, therefore, is to create a narrative *'of which one might say 'I can see that happening'* (Connelly & Clandinin, 1990, p. 8). However, I am not setting out to

prove the efficacy of the CEA in a causal sense, but to create a broader contextual justification for the CEA components and to achieve insights that are useful to educators (Cortazzi, 1993). The DPEP narrative aims to support the '*reconstruction and interpretation of subjectively meaningful features and critical episodes*' and '*to see the unities, continuities, and discontinuities, images and rhythms*' (Cortazzi, 1993, p. 6). In essence, I am not setting out to present the DPEP as a 'success story', but to explore 'the good, the bad and the ugly' in an effort to offer greater insight into the curriculum innovation process. Subsequently, the DPEP self-study presents both subjective and objective data to track my 'subjective trajectory' within the components of the CEA which include the '*wider political and economic events*' (Ball & Goodson, 1986, p. 11).

Personal Data Sources

It is important that I acknowledge my initial interest in curriculum innovation was not an academic venture, but stemmed from a concern about the practical application of PE in primary schools. As such, the DPEP was not set up as a research project, but as a genuine effort to bring about change in the PE curriculum. Consequently, unlike many of the contextual sources that follow, not all of my personal data comes from written texts, but from retrospective reflections on events covering the 24 years of the project. As such, the chapters do not use data sources in a conventional sense and the evidence will not be presented in the traditional manner. I will use a personal narrative writing approach as a process to review my educational experiences and practices and to consider the new possibilities that have emerged (Mitchell & Weber, 1999). More specifically, I will use a scholarly personal narrative approach (Nash, 2004; Ritchie & Wilson, 2000) that will enable me to trace the development of my

particular concerns and interests while locating them in relation to my own experiences and changing contexts as well as to relevant literature and political issues. Central to this scholarly narrative is the iterative and 'messy' process of drafting, writing, redrafting and rewriting drafts which, over time, has helped shape my personal understanding within the bounds of the changing contexts in which I have worked and within the evolving components of the CEA . These efforts have helped me go some way towards 'depthful writing': a process of visiting and revisiting a piece of work to create a finely crafted outcome that often reflects the personal 'signature' of the author (van Manen,1990, pp. 131–132)

Subsequently, the personal data sources informing the DPEP chapters have come from both formal and informal sources. The formal sources, particularly evidenced over the last decade, are the texts I have written for academic and professional publication and for presenting at conferences (see Table 3.5).

Table 3.5 Personal Publications and Conference Presentations

Academic Publications and Conferences

1990-1992: Primary PE

- **Academic Publications:** Jess, 1990, 1991, 1992

1997-2005: Basic Movements, Psychology and Lifelong Learning

- **Academic Publications:** Basic movement competence (Jess & Collins, 2003; Jess, Gagen, McIntyre, Perkins, & McAlister, 2006); PE and Lifelong learning agendas (Penney & Jess, 2004).
- **Research Conferences:** Basic movement competence (Jess & Moore, 1997; Jess, Collins & Burwitz, 1998; Jess & Collins, 2002), Basic movement research studies (Jess, Collins, Dewar, Campbell & Harris, 2002; Jess & Liggett, 2002; Jess, Fraser, Collins, Sowerby & Martindale, 2002), PE as a lifelong endeavour (Jess & Penney, 2004; Penney, Jess & Thorburn, 2006).

2008 onwards: Developmental PE, Complexity Theory and Professional Learning

- **Academic papers:** Primary PE teaching (Jess, 2011); Sport Education (Jess, Carse, MacMillan & Atencio, 2011); PE policy (Thorburn, Jess & Atencio, 2009; Thorburn, Jess & Atencio, in press), complex curriculum (Jess, Atencio & Thorburn, 2011), professional learning (Atencio, Jess & Dewar, in press; Thorburn, Carse, Jess & Atencio, in press; Elliot, Atencio, Campbell & Jess, under review) and early years PE (McEvilly, Atencio, Verheul & Jess, under review).
- **Research Conferences:** Curriculum (Jess, Atencio & Thorburn, 2008), professional learning (Atencio, Jess & Dewar, 2009) PE teacher development in the primary school (Atencio, Elliot, Campbell & Jess, 2010).

Professional papers (2004 onwards)

- Preschool PE (Jess & MacIntyre, 2009); the Basic Moves programme (Jess, 2004; Jess, Dewar & Fraser, 2004; Jess, 2006a), an invited primary PE trilogy (Pickup, Haydn-Davies & Jess, 2007; Haydn-Davis, Jess & Pickup, 2007; Jess, Pickup & Haydn-Davies 2007), primary PE developments in Scotland (Jess, 2007; Jess & Dewar, 2008; Wood & Jess, 2009) and Developmental PE (Jess, 2011).

The academic sources come from three periods across the DPEP years. The first set of writing was three articles for the Scottish Physical Education Journal which set out my initial frame of reference around children's motor development (Jess, 1990) and physical activity (Jess, 1991), and the state of primary PE in Scotland (Jess, 1992). The second set comes from the period of my first PhD attempts between 1997 and

2005, when my writing focussed on creating a psychology-informed case for a developmental orientation towards children and young people's PE, sport and physical activity. During this period, most of my efforts were papers presented at national and international academic conferences focussed on the case for basic movement competence (Jess & Moore, 1997; Jess, Collins & Burwitz, 1998; Jess & Collins, 2002), findings from basic movement studies (Jess, Collins, Dewar, Campbell & Harris, 2002; Jess & Liggett, 2002; Jess, Fraser, Collins, Sowerby & Martindale, 2002) and PE as a lifelong endeavour (Jess & Penney, 2004; Penney, Jess & Thorburn, 2006). These conferences acted as the catalyst for a small number of academic papers on basic movement competence (Jess & Collins, 2003; Jess, Gagen, McIntyre, Perkins & McAlister, 2006) and lifelong learning agendas (Penney & Jess, 2004). Finally, following a period of gradual re-orienting towards a more complexity focussed agenda, and the growth of the DPEG, I have added considerably to my academic portfolio. Since 2008, I have been involved in international conference presentations on complexity theory and curriculum (Jess, Atencio & Thorburn, 2008), complexity and professional learning (Atencio, Jess & Dewar, 2009) and PE teacher development in the primary school (Atencio, Elliot, Campbell & Jess, 2010). In addition, I have generated various publications that include book chapters (Jess, 2011; Jess, Carse, MacMillan & Atencio, 2011) and academic papers on PE policy (Thorburn, Jess & Atencio, 2009; Thorburn, Atencio & Jess, in press), curriculum (Jess, Atencio & Thorburn, 2011), professional learning (Atencio, Jess & Dewar, in press; Thorburn, Carse, Jess & Atencio, 2011; Elliot, Atencio, Campbell & Jess, under review) and early years PE (McEvilly, Atencio, Verheul & Jess, under review). In addition to these academic papers, I have also delivered in excess of 100

professional presentations and CPD courses, and written numerous professional papers as part of the dissemination process. In particular, between 2004 and 2011, I have written a series of manuals and papers on primary PE that are focussed on preschool PE (Jess & MacIntyre, 2009); the Basic Moves programme (Jess, 2004; Jess, Dewar & Fraser, 2004; Jess, 2006a), an invited primary PE trilogy (Pickup, Haydn-Davies & Jess, 2007; Haydn-Davies, Jess & Pickup, 2007; Jess, Pickup & Haydn-Davies 2007), primary PE developments in Scotland (Jess, 2007) and developmental PE (Jess, 2011). In addition, between October 2002 and October 2006, I wrote 16 updates in the 'News from Scotland' section of the British Journal for Teaching PE. Further, there was a five year period when I was invited to deliver many national and UK-wide presentations focussed on the 'Case for Basic Moves'. Consequently, these academic and professional papers and conference presentations, particularly over the last decade, are key data sources which have bound my curriculum innovation efforts.

At the less formal level, the main data sources have been my personal diaries which I wrote until the early 1990s, my professional daily diaries which I have kept throughout the period of the DPEP, and my workbooks on which I make scribbled notes, drawings and figures at almost every meeting I have attended since entering higher education, and particularly during the more collaborative delivery phase from 2001. Although these workbook 'texts' are informal, they include many bullet-pointed 'what next' sections, particularly from the early collaborative and individual DPEG meetings, and have particularly helped me re-engage with key issues. From a more reflective perspective, the diaries have helped me revisit many key events that

turned out to be ‘bifurcation points’ (Prigogine, 1997) and resulted in a major trajectory change in my curriculum innovation effort.

Contextualising Data Sources

The data which helps contextualise the DPEP include published texts which come in two main forms: government and government agency texts which set the policy context, and academic texts which interpret key issues influencing my innovation efforts. The government and government-related texts which set the policy context are primarily education acts (e.g. DES, 1988; Scottish Parliament, 1999), parliamentary reports (e.g. Scottish Government, 2009); curriculum guidance (e.g. DES, 1992; SOED, 1992; Scottish Government, 2009) and PE, physical activity or sport related reports (e.g. DoNH, 1995; Scottish Executive 2003a, 2004b). In addition, government-related texts are mostly PE-related material from government agency reports and documentation (e.g. HMIe, 2001; Ofsted, 2005; sportscotland, 2008). The academic texts come from a range of sources and cover books and papers from a number of different fields. In the initial stages of the DPEP, the main source of data was motor development (e.g. Clark & Whitall, 1989; Haywood, 1986) and developmental PE (e.g. Gallahue, 1987; Graham, Holt-Hale & Parker, 1980) literature. However, between 1997 and 2004, with my first PhD attempt focussed on more psychology-oriented issues, my reading extended to include competence motivation (e.g. Harter, 1978), exercise psychology (e.g. Fox & Biddle, 1989), achievement motivation (e.g. Nichols, 1984) and lifelong participation issues (e.g. Welk, 1999). Finally, since early 2007, the texts informing my work have extended to focus on broader theoretical perspectives that include situated perspectives (e.g. Lave & Wenger, 1991; Rovegno, 2006), dynamical systems (e.g. Thelen, 1995),

ecological theory (Newell, 1986) and complexity theory (e.g. Light, 2008; Biesta, 2010; Morrison, 2010). These texts have been supplemented by additional reading on the PE curriculum (e.g. Penney, 2006), professional learning (e.g. Day, 1999) and, most recently, education policy (e.g. Ball, 2008).

Therefore, as noted above, the DPEP chapters will not be presented in a traditional research manner, but by providing empirical evidence generated through a self-study, set within clear personal and contextual parameters. The data sources for the chapters are an amalgam of my personal reflections and written texts, alongside government, government-related and academic texts that cover a range of theoretical and topical issues. As such, this personal and objective data is being used to construct a case that aims to support the CEA as a possible way forward for future curriculum innovation agendas.

Section Summary

The final section of this chapter extends beyond the discussion about the CEA by describing the key components of the thesis, namely the questions, structure and data sources. Subsequently, to further contextualise the thesis, the next chapter will consider the contemporary literature on curriculum innovation in PE.

Chapter Four: Curriculum Innovation in Physical Education

4.1 Introduction

While the focus of this thesis is to explore the potential of the Complex Ecological Approach (CEA) in curriculum innovation, as noted earlier, the backdrop will be my personal innovation efforts in primary PE over the last 24 years. Consequently, to contextualise this exploration in line with the innovation themes already discussed, the chapter presents an overview of the literature on curriculum innovation in PE in the five related sections.

1. PE in the early 21st Century
2. Concerns within PE
3. Contemporary Thinking on Innovation in PE
4. Top-down Curriculum Innovation in PE
5. Bottom-Up Curriculum Innovation in PE

The first section focuses on the recent upturn in the fortunes of PE across the UK, while the sections that follow consider the concerns being raised from within the PE profession and present some of the contemporary thinking informing these concerns. The chapter then discusses how top-down, centrally-driven curriculum innovations appear to have had a significant impact on the paucity of curriculum innovations emerging from within the PE profession, particularly in the last decade. The chapter concludes by summarising the current state of PE curriculum innovation. Two points further contextualise the chapter. First, the sections do not set out to undertake a detailed analysis of PE curricula, but to include those aspects that help contextualise the personal narrative that follows. Second, while the focus of the

chapter is PE in the UK, where appropriate, reference will be made to literature from other parts of the world.

4.2 PE in the Early 21st Century

The last twenty years have been paradoxical for PE in the UK. Long marginalised within education (Houlihan & Green, 2006), PE has gradually moved towards the centre of the school curriculum (Thorburn, Jess & Atencio, 2009). In England, this shift has been made on the back of a traditional sport agenda (Penney & Evans, 1999), whereas in post-devolution Scotland progress has been more closely connected to the emergence of health and wellbeing (Scottish Government, 2009), lifelong learning (Scottish Executive, 2003b) and physical activity (Scottish Executive, 2003a) as key policy developments. Consequently, as this thesis is being written in early 2011, PE has become one of four core subjects in the new English National Curriculum, along with English, Maths and Science (Gove, 2010), while in Scotland it is the only subject area in the Curriculum for Excellence which has a designated two hour per week expectation (Scottish Government, 2009). Given its long time marginal status, it would appear that PE could not be in a healthier state.

4.3 Concerns within PE

Within this seemingly positive contemporary context, considerable disquiet has been voiced across the academic branch of the PE profession. Calls for change to traditional curricula, pedagogy and professional learning approaches have been a consistent feature of the PE literature (e.g. Evans, 1990; Locke, 1992; Penney & Chandler, 2000; Jess & Collins, 2003; Kirk, MacDonald & O'Sullivan, 2006; Armour, 2010). Within the context of this thesis, three main concerns are worthy of

consideration: the traditional PE curriculum, PE professional learning and, given the focus of my personal narrative that follows, primary PE.

For many years various authors have taken issue with the dominant PE curriculum model and its apparent inability to support children and young people's health and well-being engagements and lifelong physical activity aspirations (Locke, 1992; Penney & Chandler, 2000; Kirk, 2004; Thorburn, Jess & Atencio, in press). In particular, there has been unease with the dominance of a '*PE-as-sport-technique'* approach and its associated multi-activity 'block' curriculum which presents children and young people with five or six week 'blocks' of different physical activities (Kirk, 2010). It is perceived that this approach offers a limited PE experience because of the time spent attempting to reproduce specific knowledges drawn from abstracted elements of different sports (Penney & Chandler, 2000). As a consequence, PE in schools is often made up of a series of behaviourist inclined learning experiences that are both fragmented and de-contextualized (Siedentop, 1994) and are little more than a sampling exercise (Cothran, 2001). Kirk (2004) contends that this behaviourist learning approach fits a '*schooling for docility-utility*' model (p. 201) which seeks to produce physically educated pupils who can reproduce these specified knowledges. Light (2008) similarly argues that behaviourist approaches to teaching PE typically involve a 'training' approach which 'requires a highly structured and technical pedagogical approach' (p. 23). Consequently, this approach offers few opportunities for sustained and meaningful engagement of a form which enables transfer of learning across a range of age levels, curriculum areas and out-of-school contexts (Thorburn et al., 2009). For many, there is a view that the

nature of this traditional PE curriculum will need to change (Kirk, 1997; Penney, 2006).

Similar concerns have also been voiced with the traditional professional learning activities employed to disseminate the different PE curriculum innovations amongst teachers and physical activity professionals (Armour & Yelling, 2003). In the main, PE-CPD has mirrored the behaviourist-inclined sampling of the PE curriculum and, as a consequence, PE-CPD has often been considered too brief, lacking in depth and challenge and displaying limited coherence, relevance and progression (Armour & Yelling, 2004; Smith & Thomas, 2006). Consequently, PE-CPD has a poor reputation (Armour, Makopoulou, Chambers & Duncombe, 2010), particularly when outside experts make little effort to discuss how the content might be applied to the specific teaching contexts in which teachers are working (Bechtel & O'Sullivan, 2006). Indeed, Bechtel and O'Sullivan found that teachers' knowledge of context, content and pupils was not valued and considered a barrier to successful implementation of a curriculum innovation. Therefore, while PE-CPD is increasingly recognised as a key feature of the curriculum innovation process, there are concerns about both the nature and the quality of the activities experienced by teachers.

Finally, given the focus of the personal narrative that follows, it is important to highlight that concerns have long been expressed within the UK and globally about the status of primary PE (Hardman & Marshall, 2005). PE literature has consistently emphasised the low subject status of primary PE (Pollatschek, 1979; Warburton, 1989; Jess, 1992; Shaugnessy & Price, 1995; Carney & Winkler, 2008), especially in relation to subjects such as English, mathematics and science (Pickup &

Price, 2007). Consequently, significant weaknesses in the teaching of primary PE have been reported, predominantly in relation to planning, expectation, pace and assessment (HMIe, 2001; Ofsted, 2005). There are many reasons for this perceived weakness which include the limited nature of class teachers' initial teacher education/training in PE (Kerr & Rodgers, 1981; Carney & Guthrie, 1999; Office for Standards in Education (Ofsted) 2000; Caldecott, Warburton & Waring, 2006) and the fact that primary teachers participate in comparatively little PE-CPD (Harris, Cale & Musson, 2011) with some reportedly attending no PE-CPD throughout their careers (HMIe, 2001). Subsequently, a lack of content knowledge has been shown to contribute to many class teachers' reduced confidence in teaching PE (Ofsted, 1998; HMIe, 2001; Faucette, Nugent, Sallis & McKenzie, 2002; Morgan & Bourke, 2004) and an uncertainty about what they are doing (DeCorby, Halas, Dixon, Wintrup, & Janzen, 2005; Hart, 2005). It is perhaps not surprising therefore, that many primary teachers hold negative attitudes towards PE (Portman, 1996; Xiang, Lowy & McBride, 2002). Therefore, although PE in the UK in 2011 appears to be in a healthy state there are, within the PE profession, concerns about the curriculum, teachers' professional learning experiences, status and the provision of primary PE.

4.4 Contemporary Thinking in PE

Kirk (1997) has suggested that PE needs to change due to the changing worldview that sees a range of post-modern theories replacing long-held modernist views of knowledge and the self. He, and others (e.g. MacDonald, 2003; Wright, Burrows & MacDonald, 2004), propose that knowledges and practices associated with the body, physical activity and movement are not fixed entities. They argue that PE must become more relevant and attuned to the needs of young people whose increasingly

complex lives are now marked by '*profound social and cultural changes'* which means that '*health and the values and meanings associated with physical activity and sport*' are diverse and shifting (Wright, 2004, p. 3). In essence, the conditions of post-modernity have necessitated that those involved in PE must now negotiate notions of uncertainty, multiplicity, and contradiction (Fernandez-Balboa, 1997). As such, in response to the provision of 'fixed and specialist skills' which renders both PE teachers and pupils 'docile', Wright (2004), argues that curricular and pedagogical practices should instead develop pupils who can grasp and '*deal with the uncertainty of conflicting and changing knowledge*' (p. 6).

As this shift from more positivist thinking continues, so PE academics have increasingly engaged with a range of post-modern theories which include interpretive (Evans, 1986; Pope, 2006), socially critical (Fernandez-Balboa, 1997; Tinning & Glasby, 2002; Devis-Devis, 2006), feminist (Scraton & Flintoff, 1992; Flintoff, 1994; Nilges, 2006) and poststructuralist (Fernandez-Balboa, 1997; Wright 2006) perspectives. In addition, and of particular interest to this thesis, there has also been a significant increase in authors engaging with learning in PE from a complexity-oriented perspective e.g. constructivism (Rink, 2001; Azzarito & Ennis, 2003; Rovegno & Dolly, 2006), situated perspectives (Kirk, 2004; Armour & Yelling, 2004; Bechtel & O'Sullivan, 2006), ecological theory (Hastie & Siedentop, 2006), dynamical systems (Chow, Davids, Button, Shuttleworth, Renshaw & Araujo, 2007) and, more recently, complexity theory (Light, 2008; Hopper & Sandford, 2010; Storey & Butler 2010; Jess et al., in press). Although these different theoretical perspectives all have slightly or significantly different viewpoints (Wright, 2006) they are all attuned to notions of uncertainty and all hold there is no single 'Grand

Theory' for all contexts. Yet, while there has been this *shift in emphasis* away from behaviourist strategies there is still an acknowledgement that more positivist theories still contribute to PE in unique ways (MacDonald, Kirk, Metzler et al., 2002; Jess et al., 2011). For example, behaviourist pedagogical approaches have demonstrated their usefulness in PE contexts in relation to classroom management, the provision of 'safe' learning experiences when difficult or dangerous movements are required, and the teaching of disabled students (Siedentop & Tannehill, 2000; Collier, 2005).

Therefore, although PE appears to have made significant headway in taking up a more central role within the school curriculum (Thorburn et al., 2009), PE academics have voiced concerns about the traditional curriculum approaches that dominate much current practice in PE and are increasingly articulating views from more contemporary theoretical perspectives. As will now be discussed, however, this contemporary thinking is only gradually percolating into curriculum practices.

4.5 Top-Down Curriculum Innovation in PE

Since the late 1980s, the unparalleled central government input to education has not only resulted in a consistent top-down approach to PE curriculum innovation (Kirk, 2010), but has led to a distinct lack of bottom-up curriculum innovation from within the PE profession. For example, in England, particularly during the 1990s, the conservative government introduced the first PE national curriculum based on the multi-activity curriculum model (Department for Education and Science (DES), 1992). At this time PE continued to be marginalised by education policy makers (Houlihan & Green, 2006), which enabled the government to push forward its traditional elitist sport agenda which was aimed at putting competitive team games at

the heart of school life (Penney & Evans, 1999). Further, from 1997 onwards, New Labour's PE and school sport (PESS) strategy remained on a similar trajectory (Houlihan, 2000) but extended the project's goals to tackle a much wider range of issues including: social exclusion, community cohesion, health and obesity and crime and anti-social behaviour (Coalter, 2008; Collins, 2010). Consequently, from 2003 onwards £2.4 billion was invested into the PESS project in order to develop specialist sport colleges and school sport partnerships (Gove, 2010), highlighting the sustained focus on sport as opposed to a broader PE agenda. However, the recent coalition government have slashed this PESS funding (Gove, 2010) and, at the time of writing, it is unclear exactly how the PESS agenda will be developed over the next five years. As such, since the 1980s, PE curriculum innovation in England has increasingly shifted from the PE profession to become closely aligned with the political aspirations of successive governments.

In Scotland, government intervention in PE has historically lacked clear progression or cohesion as various phases of the curriculum have been created out of sequence and independently in terms of curriculum aims (Penney, Jess & Thorburn 2006). This ad hoc sequence of development is evidenced in the publication dates of key documents for PE in preschool (Scottish Consultative Council on the Curriculum, 1999), the 5-14 curriculum (Scottish Office Education Department (SOED) 1992) and for the middle secondary standard grade (Scottish Office Education and Industry Department (SOEID), 1977) and senior secondary higher grade curriculum (Scottish Examination Board (SEB), 1993). Developmental and conceptual alignment of the respective age phases has subsequently been lacking. Most notably, the standard grade courses introduced in the late 1970s and 1980s followed a clear performance-

oriented multi-activity curriculum model (Scottish Office Education And Industry Department (SOEID), 1977), while the 5-14 PE curriculum guidance later presented a more aesthetically-oriented rationale linked to more traditional multi-activity programmes of study (SOED, 1992). Pre-school PE, as in England, was not only rebranded as physical development but had few apparent connections to the 5-14 guidance.

More recently, with the introduction of the Curriculum for Excellence (Scottish Government, 2009), PE has not only been re-housed within the new core subject area of Health and Well Being, but efforts have also been made to offer teachers more autonomy in developing an all-through 3-18 PE curriculum that integrates learning across and beyond the school setting. Consequently, as will be discussed in more depth in Chapter Six, the long-marginalised areas of pre-school and primary PE have received an unprecedented boost in terms of curriculum time and professional learning opportunities (Jess & Dewar, 2008). Therefore, although the last three decades has seen PE become increasingly government-controlled and remains closely aligned to a traditional multi-activity PE curriculum, recent developments in Scotland suggest there may now be some potential to develop some of the more contemporary approaches discussed earlier.

4.6 Top-Down Professional Learning in PE

Directly linked to these top-down curriculum innovations, national PE-CPD programmes have become a key feature of the dissemination process (Thorburn & Collins, 2006; DfES, 2003). However, many of these national programmes have had limited success with much ‘slippage’ between the aspirations of the official PE

policy texts and the linear implementation process employed (Kirk, 1986; Armstrong, 1996; Macdonald & Glover, 1997; Penney & Jess, 2004). Examples of this traditional approach to PE-CPD can be seen in the National PE and School Sport Professional Development (Armour & Duncombe, 2004) and TOPs (Harris et al., 2011) programmes in England and the higher certificated course in Scotland (McPhail, 2004). The TOPS[5] professional development programme was accessed by primary teachers attending a generic four-hour course focused on familiarising them with the TOP Play and TOP Sport resources, possibly supplemented by follow up short courses in more specific areas. With high aspirations to raise standards of PE and school sport (Haskins, 2003), Harris et al., (2011) found that the restricted nature of the programme and the lack of follow up support resulted in the impact of the programme being *'restricted due to its limited ability to address key pedagogical issues (such as medium-term and long-term planning, and assessment) and to meet the variable needs of a diverse group of teachers '*(p. 300*).*

In the Scottish context, the dissemination of the higher PE certificated course between 1998 and 2001 saw one teacher per secondary school attend eight days of 'training' and was then expected to 'cascade' the information to colleagues in their

[5] Harris et al (2011) report that 'The TOPs (C)PD programme was devised for primary school teachers by the Youth Sport Trust (YST), a registered charity established in 1994 in England to develop and implement quality PE and sport programmes for young people. The TOPs PD programme comprised a series of programmes, the first two being TOP Play and TOP Sport. TOP Play focuses on the acquisition and development of core games skills amongst children aged four to seven years, and TOP Sport provides children aged seven to 11 years with opportunities to develop skills in a range of sports, building upon the core skills in TOP Play. Additional TOPs programmes such as TOP Dance and TOP Gymnastics were later developed. TOP Play and TOP Sport were introduced into primary schools in England during 1996/97 and there was a second phase of the TOP programmes in 2002 to re-align them to the revised National Curriculum for Physical Education (Department for Education and Employment and the Qualifications and Curriculum Authority 1999)'(p. 293).

own schools. Livingston and Robertson (2001) note that this cascade model was adopted on a wholesale basis for all higher courses despite limited supporting evidence for its effectiveness. In addition, Brewer (2003), with specific reference to higher grade PE, highlighted the adverse effects of teachers' lack of subject knowledge when stating that *'the extended advice regarding the nature of knowledge and understanding underpinning higher PE began to threaten teacher confidence to deliver the appropriate detail of required content*' (p. 589) and resulted in a lack of active student engagement with the learning process (Thorburn & Collins, 2006). In fact, MacPhail (2004) warned about the dangers of 'de-professionalism' as teachers were required to reproduce curriculum guidelines rather than re-contextualise such guidance.

This short section highlights how the last thirty years of centrally-driven programmes in the UK have not only sustained the domination of a traditional multi-activity PE curriculum, but have also involved professional learning activities focussed on the linear transmission of dissemination efforts. As will now be discussed, these top-down programmes are also one of the reasons why bottom-up curriculum innovation from within the PE profession has been slow in happening.

4.7 Bottom-Up Curriculum Innovation in PE

While the multi-activity model still dominates PE, in line with the contemporary thinking discussed above, there is an emerging body of literature focussed on more contemporary curriculum and professional learning approaches. While curriculum innovation has, in the main, been limited, Penney's (2006) plea for *''expanded' conceptualisations of curriculum and research projects'* is beginning to bear some

fruit and at least four contemporary themes have emerged: connectedness, authenticity, lifelong and complexity.

Building on the work of Michael Young (1975), Penney and Chandler (2000) proposed that the PE curriculum should be viewed as a *'connective specialism'* and move beyond its place as a discrete stand alone secondary school subject to more clearly integrate across and beyond the school setting. While the multi-activity approach focuses on divisions and differences, they proposed that PE needs to identify the knowledge, skills and understanding that underpin this connected vision. Consequently, there is a need to establish the core learning towards which teaching and learning should be explicitly directed. It is this core learning, similar to OGRs, that should be privileged in PE and not the specific and discrete physical activities.

In a similar vein, Rovegno (2006), from a situated perspective, proposes that '*school-based learning should reflect, in substantive ways, how the subject matter is used outside school and in broader communities of practice'* (p. 264). Specifically, she recommends that authentic PE learning experiences should be created to contextualise children and young people's learning within 'real life' scenarios. Kirk and Kinchin (2003) also believe situated learning enables the exploration of the complex relationship between different forms of culture, namely sport, exercise and leisure, and the impact of PE pedagogy on the lives of young people. Situating learning in this way captures the lived experiences of the young people, and shows how as learners in PE they co-construct and integrate school knowledge with their lives (Kirk & Macdonald, 1998). However, while there is increasing support for personalised and collaborative learning experiences of this nature it has also been recognised that this type of authentic learning presents a pedagogic challenge for

teachers whose career experiences have been dominated by a more behaviourist inclined approach (Thorburn & Collins, 2006).

Extending the scope of this connected and situated thinking, attention has also been directed towards lifelong agendas (Corbin, 2002; Green, 2002, 2004; Penney & Jess, 2004; Schneider & Lounsberry, 2008). Penney and Jess (2004) have proposed that the PE curriculum needs to not only engage with notions of lifelong learning but also those of lifelong physical activity and lifelong health (Penney & Jess, 2004; Penney, 2006). They take the view that these lifelong agendas in PE will need to consistently inform and represent a focal reference point for curriculum innovation in schools across the 3-18 age range. As such, Penney (2006) has proposed that lifelong discourses have clear implications for the nature of future learning in PE, when she commented that with '*interest and investment in lifelong learning and learning communities it is inadequate to view PE curriculum as confined to schools or school years'* (p. 576). If PE is to seriously engage with lifelong learning agendas, it becomes increasingly important to acknowledge the learning in PE that goes on beyond the school curriculum and the school gates (Penney et al., 2006)

More recently, and in line with these other contemporary ideas, Light (2008) suggests that '*complex learning theory holds considerable promise for the ongoing development of physical education as a valuable and integral part of the school learning experience'* (p. 34), particularly when it acknowledges the ways in which learning is deeply situated in particular cultural, social and physical contexts. Subsequently, it is now being argued that those involved in PE actively construct their own meanings and understandings (O'Sullivan & Deglau, 2006) relative to their '*prior and existing knowledges and practices'* (Rovegno & Dolly, 2006, p. 242).

As such, although a very recent addition to the PE curriculum literature, a complex approach, similar to constructivism, signals a clear move away from the behaviourist and outcome-driven approaches to PE and presents a more collaborative, reflective and constructivist learning model that pays attention to diverse and changing knowledges (Rovegno, 2006; Light, 2008; Davis & Sumara, 2010).

While notions of connectivity, authenticity, lifelong and complexity are gradually becoming more common in the PE literature, there are surprisingly few examples of substantive curriculum innovations from within the PE profession, particularly in the primary PE context (Penney, 2006). As the volume of academic literature increases, so a small number of more contemporary curriculum and professional learning developments have emerged. The two most significant curriculum innovations over the last 30 years have been teaching games for understanding (TGfU) (Bunker & Thorpe, 1982), now often referred to as game-centred approaches (GCA) (Oslin & Mitchell, 2006), and sport education (Siedentop, 1982). Both approaches have spawned increasing amounts of research and change in teachers' practice worldwide (Butler & Griffin, 2010; Hastie, in press), although neither model emerged from the original authors' leanings towards contemporary theoretical perspectives. In both cases, as with many innovations (Ely, 1999), these innovative ideas emerged as a reaction to the dominant PE curriculum models.

In addition, although neither innovation addresses the entire PE curriculum, they offer important insights into the application of the more open-ended, situated and complexity-oriented thinking discussed above. The TGfU approach is based on the notion that games teaching could be designed in such a way that the games could be both developmentally appropriate and conditioned to develop tactical awareness. By

creating different broad game categories i.e. invasion, central net, striking and fielding, and target (Thorpe, Bunker & Almond, 1986), TGfU sets the context in which children can be supported to make decisions about the nature of their games, tactics and movement skills. As such, TGfU focuses more on the cognitive and affective experiences of the children and moves beyond the traditional behaviourist movement-skill pedagogy that dominated games teaching. Closely linked to these child-centred notions, sport education was designed as a reaction to the de-contextualised nature of sport in the PE curriculum. Specifically developed for children in the late primary school years and beyond, sport education (Siedentop, 1994) offers children and youth more authentic experiences by creating teams that endure for sport seasons that last longer than the usual PE 'block'. Subsequently, team members take an active role in their own sport experience by serving in the various roles seen in the authentic sport setting such as captains, coaches, trainers, statisticians, officials and publicists. Teams develop affiliation through cooperative and competitive experiences to learn and develop skill and tactical play, but also through the creation of team strips and names. The goals of sport education are therefore to develop competent, literate and enthusiastic players who have sufficient skill, knowledge and attitude to participate satisfactorily in sport.

As both TGfU and sport education have developed and expanded across many parts of the world (Butler & Griffin, 2010; Hastie, in press) both have been increasingly linked to a range of constructivist, situated and complexity-oriented theoretical models (Kinchin, 2006; Oslin & Mitchell, 2006; Light, 2008). In a UK context, while there is evidence of TGfU (Kirk & MacPhail, 2002) and sport education (Penney, Clark, Quill & Kinchin, 2005) making some inroads in England, their

introduction in Scotland has been slow and it is only recently that both innovations have started to make progress (Gray, Sproule & Wang, 2008; Begg & Watson, 2010; Jess et al., in press).

Three other potential curriculum innovations have made varying degrees of impact on the PE profession, although each remains more marginal than sport education and TGfU. Health-related physical activity (Welk, Eisenmann & Dulham, 2006), with its logical link to the PE curriculum, has not been particularly well embraced by PE policy makers or physical educators. It has been suggested that this ambivalence may be due to a dominant functionalist biological approach to exercise (Kirk, 2010) which may be at odds with the physical capital young people bring to the PE setting (Evans, 2004). However, there are a few examples of more holistic health-related programmes which may have the potential of addressing this issue in future (e.g. Cale & Harris, 2006; MacKenzie, Cohen, Sehgal, Williamson & Golinelli, 2006).

Another curriculum area, outdoor and adventure activities (OAA) (Quay, 2003; Brown, 2006) includes a number of leisure activities like cycling, walking and sailing and has a close connection with lifelong agendas (Fairclough, Stratton & Baldwin, 2002). Further, OAA is closely linked to aspects of experiential learning theory (Dewey, 1938), sustainability, spirituality and other curriculum areas and, as such, a pedagogy focussed on affective development. However, OAA has been difficult to timetable particularly as it doesn't fit with the dominant model of PE and is often 'covered' in a one-off off-site 'block' over weekends or even a week (Beames & Atencio, 2008).

Finally, and directly linked to the affective domain, Hellison's 'Taking Personal and Social Responsibility' (TPSR) approach to PE (Hellison, 1985) has received considerable support from many within the PE profession (e.g. Bain, 1988; Kirk, 1992; Holyrood & Armour, 2003; Gordon, 2005). The attraction of this approach has been its focus on helping children and young people learn to be responsible by presenting them with increasing levels of responsibility and by carefully shifting a significant portion of the decision-making responsibilities in their direction. As such, the model strives to help students feel empowered, to experience making commitments to themselves and others, to live by a set of principles, and to be concerned about the well-being of others. However, there are few, if any, examples of Hellsion's approach being actively employed in the UK and only sporadically in PE around the world (Hellison & Martinek, 2006).

Therefore, while PE remains dominated by the traditional model, the curriculum examples discussed would suggest that some progress, although slow, is being made to re-orient the PE curriculum in a direction that is more open-ended, inclusive and connected. However, most of these developments have taken place at the secondary school level with, as noted earlier, the primary school level being generally marginalised. However, one recent primary PE project is worthy of mention. In line with Penney and Chandler's idea of a 'connective specialism', Quay and Peters (2008), in Australia, have focussed on making more holistic connections between various aspects of the PE curriculum. Although not introducing a specific curriculum innovation themselves, they created a curriculum programme that set out to overtly connect skill and fitness, personal and social development and physical activity components. By creating a nested curriculum model that included

fundamental motor skills, creative games making, TGfU, sport education and Hellison's TPSR (See Figure 4.1), they developed this more connected and holistic package to provide children with the conceptual understanding and social ability to help them organise their own games beyond the PE setting, be that at interval-time, lunch-time, home or the local park.

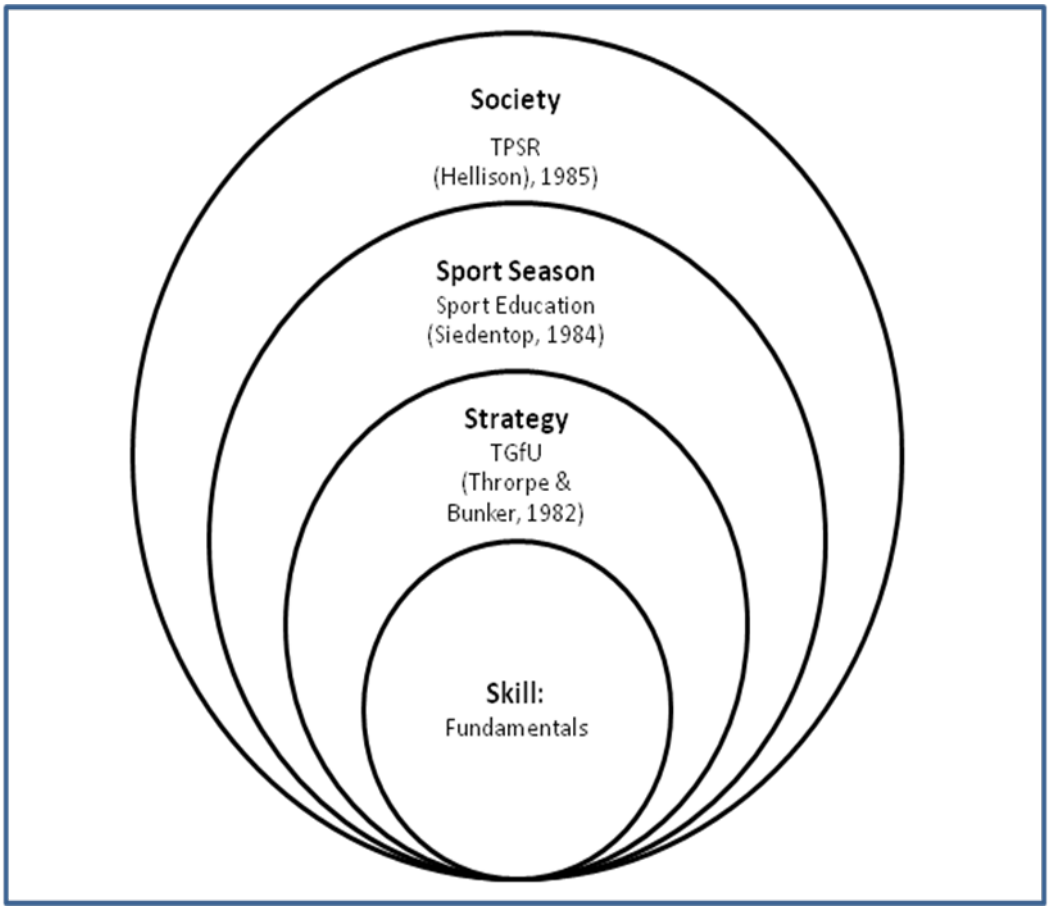

Figure 4 .1 A 'Nested' PE Curriculum (adapted from Quay & Peters, 2008)

Therefore, although PE practices are still locked into a multi-activity model, more contemporary thinking is, in a limited number of examples, beginning to gradually impact upon both the structure and the nature of the PE curriculum.

4.8 Bottom-Up Professional Learning in PE

While professional learning is critical to the dissemination of a PE curriculum innovation, professional learning, itself, has recently become a topic of considerable interest in education and PE (Armour, 2010). Consequently, contemporary thinking about PE-CPD has moved rapidly and has been informed by a number of pragmatic and theoretical developments (Armour & Yelling, 2003; Bechtel & O'Sullivan, 2006). The limitations of the traditional PE-CPD model (Armour & Yelling, 2002), the gap between official PE texts and practice in schools (Curtner-Smith, 1999; Johns & Dimmock, 1999; Thorburn & Collins, 2006), the increasing attraction of constructivist, situated learning and complexity theories (Duncombe & Armour, 2003; Atencio, Jess & Dewar, in press) and findings from PE-CPD research studies (Bechtel & O'Sullivan, 2006; Armour & Yelling, 2007) have all contributed to developments in PE-CPD thinking. However, while there is a growing consensus that PE professional learning needs to change there is also an awareness that teachers' professional learning is generally patchy and there are few examples of teachers building a coherent set of experiences over time (Bechtel & O'Sullivan, 2006). In fact, there is an acknowledgment that designing effective professional learning opportunities for teachers in PE is a difficult challenge (Armour & Yelling, 2004; Deglau, 2005; Rink & Mitchell, 2002; Ward & Doutis, 1999).

Although PE-CPD research has been limited, and mostly US based, it has generated similar findings to more general education CPD research in which contextual and personal factors have been shown to influence the effectiveness of the professional learning process (Bechtel & O'Sullivan, 2006). From a contextual perspective, the school culture (Rovegno & Bandhauer 1997a), the micro-politics within the school

and department (Sparkes, 1998) and the actual workplace conditions, particularly the support from management and colleagues (Stroot, Collier, O'Sullivan & England, 1994) have all been shown to have a significant impact on PE teachers' professional learning.

Further, at the more personal level, many of the capacities discussed in Chapter Three have also been shown to influence PE teachers' professional learning. These have included helping teachers:

- Examine their beliefs as content knowledge (Ennis, 1994; Bechtel & O'Sullivan, 2006)
- Develop appropriate knowledge and practices aligned with the theory driving curriculum projects (Rovegno & Bandhauer, 1997b)
- Acknowledge new approaches are difficult and need a willingness to change, learn new ideas and suspend judgment on the changes until they have been tried out (Rovegno & Bandhauer, 1997b).
- Acknowledge that emotions impact on decision making in the teaching context (McCaughtry, Martin, Hodges-Kulinna & Cothran, 2006)
- Recognise the importance of reflection and engaging with colleagues beyond the teacher's own classrooms and schools (Cothran, 2001)

Therefore, although PE-CPD research is limited, researchers have identified some of the key professional learning features that will help CPD move beyond an unrelated series of top-down 'fill the empty vessel' experiences. In particular, O'Sullivan and Deglau (2006) have highlighted the importance of teachers building their professional capacities and being able to work in conditions that will help them

explore more contemporary approaches to curriculum and pedagogy. There is a strong belief that teachers should be treated as professionals and 'active learners' who construct their own meanings and understandings and are supported to take on leadership roles (Bechtel & O'Sullivan, 2006). Accordingly, Armour and Yelling (2004) note that PE professional learning experiences should be situated and supported in teachers' own school settings where they can directly engage in meaningful tasks related to their work as teachers.

Teachers need to engage in professional learning that is over an extended period of time (Doutis & Ward, 1999) and designed to help them to 'review, renew, and extend' their practice (O'Sullivan & Deglau, 2006). It has also been acknowledged that while content knowledge is key to successful PE teaching, it is only part of a set of professional learning experiences which should more generally be focused on 'curriculum and pedagogy for learning in physical education' (Armour & Yelling, 2004, p. 109). Finally, teachers also need to have the opportunity to work collaboratively with other teachers in a learning community of physical educators (Armour & Yelling, 2007). However, learning communities are a complex concept and their success depends on several conditions being in place. The most important, amongst many other things, include the availability of collaborative time to share ideas (O'Sullivan & Deglau, 2006) and the recognition that tensions among professionals are to be expected and should be discussed openly with integrity (Deglau & O'Sullivan, 2006).

Therefore, although PE-CPD may, like PE curriculum, still be locked into a traditional linear and patchy approach, there is a growing body of knowledge supporting more participative, collaborative and cohesive approaches. However, for

teachers to benefit from new forms of CPD, particularly collaborative professional learning, schools will need to alter their structures, processes and priorities to enable this to happen effectively (Duncombe & Armour, 2004). Changes in school policies that allow for communities of learners to be established may first need to occur in order for this suggestion to be implemented (Armour & Yelling, 2004). PE-CPD may still have some way to go to become a core feature of teachers' career long learning but there is the recent emergence of a knowledge and research base positioned to move this agenda forward.

4.9 Chapter Conclusion

This chapter has highlighted how the reality of bringing about change in PE has consistently proved elusive (Penney & Chandler, 2000). In fact, Kirk (2010) notes there is '*little agitation for change from the majority within the physical education community' (*p. 127) and there is '*no evidence to suggest that teachers would be willing to engage in a radical reform'* (p. 124). This reticence is perhaps understandable with governments heavily investing in PE and School Sport and continuing to support the 'PE-as-sport-techniques' and multi-activity curriculum model (Houlihan & Green, 2006). Schools, therefore, have found it relatively easy to retain the subject in its traditional form (Curtner-Smith, 1999) and, as such, there is evidence that PE teachers '*know very little about the specific processes involved in curricular change*' (Cothran 2001, p. 68) and often do not have the appropriate knowledge to undertake curriculum planning (Kirk & MacDonald, 2001).

However, as has been discussed throughout this chapter, there are many who believe PE will eventually need to change because in its current state it will not connect with

future educational agendas, particularly those that champion inclusion and lifelong participation (Penney & Jess, 2004). Consequently, Kirk (2010) believes it is universities who will have a key role to play as the catalysts to create the context for change as *'it is only universities that provide the spaces for the critical intellectual work required to inform our judgements about public education, pedagogy and curriculum.'* (p. 141). While he acknowledges not all universities will wish or be in a position to be involved in this radical reform, he believes particular institutions will take a lead and '*will be the seedbeds for curriculum reform of physical education teachers' education'* (p. 144) as *'ideal hubs for the organisation of networks and partnerships'* (p. 145).

Subsequently, the chapter has helped further contextualise the thesis by summarising key contemporary issues in curriculum innovation in PE. As in most areas of education, the chapter has highlighted how innovation in PE curriculum and professional learning over the last 30 years has generally been top-down government-driven endeavours. As a result, PE curricula, pedagogy and professional learning practices have generally remained locked within a traditional behaviourist paradigm. However, the chapter has also noted how a growing body of literature promoting a more inclusive, complex and open-ended agenda for children, young people and teachers' learning has emerged. Unfortunately, with only a small number of curriculum examples applying this more contemporary thinking, there is, as yet, limited evidence of any significant change in PE practices. In fact, there appears to be some resistance amongst the PE profession to actively engage with this type of innovation process (Kirk, 2010). In addition, and of particular relevance to what follows, this chapter has also highlighted how most of these contemporary

developments have been directed towards the secondary school years and have consolidated the marginal status of primary PE within the PE profession, education and in the general wider community contexts. With this background in place the next section of the thesis will concentrate on my personal curriculum innovation in primary PE over a 24 year period between 1987 and 2011.

Chapter 5: The DPEP: Foundation Phase

5.1 An Introduction to the DPEP

To explore the potential of the complex ecological approach (CEA) in helping teachers and other educators cope with and influence the curriculum innovation process, the next three Chapters of the thesis (Chapters Five to Seven) will focus on my personal curriculum innovation efforts in PE, called the Developmental PE Project (DPEP). As a section of the thesis and as background for the exploration, these Chapters track my evolving curriculum innovation experiences over two distinct but related phases over a period of 24 years. The first Chapter (Chapter Five) considers the introductory foundation phase (1987-2001), which created the platform for the more collaborative and successful delivery phase (2001-2011) (Chapter Six) and resulted in my curriculum innovation efforts being disseminated well beyond the immediate environment. The third Chapter in this DPEP section (Chapter Seven) will discuss the extent to which the CEA contextual factors and personal capacities influenced the complexity of my innovation efforts over this 24 year period. In particular, Chapter Seven will consider how the DPEP may be conceptualised as being complex in that it has been self-organising, emergent, non-linear, ambiguously bounded, connected and nested. At this point, it is important to reiterate that until 2007 these curriculum innovation efforts were not specifically informed by the CEA and, as such, most of the narrative will be a retrospective analysis of those key contextual factors and capacities that provided the most insight into the nature of the DPEP efforts.

5.2 Introduction to the Foundation Phase

The foundation phase of my curriculum innovation efforts lasted from 1987 until 2001 and was made up of small scale and local early years PE curriculum innovation efforts (aged five to seven years). Over these 14 years, these innovation efforts were housed in a range of contexts in which I was a primary PE specialist teacher in Scotland, a primary PE lecturer and part-time PhD student in a 'new' university in England, a visiting professor in a small liberal arts college in the USA[6] and a senior PE lecturer in an 'old' university in Scotland (see Table 5.1).

Table 5.1 The Innovation Contexts of the DPEP Foundation Phase 1987-2001

Role	Phase Period	Setting	Role Characteristics	Sub Phase Focus
Teacher	1987-1991	Fife, Scotland	Peripatetic primary PE Specialist Pg student (masters)	Primary PE curriculum innovation at the local level
Lecturer	1991-1996	England	PPE Lecturer & Project Manager Exchange professor	Primary PE curriculum innovation at the local level
Researcher	1996-2001	England & Scotland	Lecturer Pg student (PhD1)	Research to create ' the case' for a developmental PPE curriculum

This phase is best characterised as a foundation phase as it helped build many of the capacities to support my on-going development and dissemination efforts during the Delivery Phase. These initial efforts revolved around an inquiry and reflection process which not only helped focus and direct my innovation efforts but also assisted with the development of a detailed knowledge base around children's motor development and developmental PE. Consequently, as the phase unfolded I was not

[6] Given my limited amount of time spent working in the USA, my experiences in Oregon will not be considered in the main text of the thesis

only able to more clearly articulate my personal vision for early years PE, but also to make initial attempts at designing and delivering an innovative developmental movement curriculum for young children. Subsequently, to explore the potential of the CEA during this foundation phase, the Chapter will be split into four related sections as follows (refer to Fig. 1.1):

1. Initial Conditions in 1987: Context and capacities
2. Contexts across the foundation phase
3. Developing Capacities across the foundation phase
4. Innovation Efforts across the foundation phase

The first section investigates the starting point of my innovation efforts in 1987 by describing the context in which my first efforts took place and also reflecting on the inadequate personal capacities which supported these efforts. From these initial conditions, this chapter discusses the main contextual factors and personal capacities that influenced my innovation efforts across the phase, and will conclude by presenting my innovation efforts in the primary PE curriculum, pedagogy and related professional learning.

Initial Conditions in 1987

The importance of understanding the initial conditions of the DPEP cannot be overemphasised as this starting point represents the basis upon which any future innovation efforts would take place (Haggis, 2008). As such, to contextualise my

initial conditions, this introductory section presents a short précis of my pre-1987 professional experiences before considering the August 1987 starting point.

Pre-1987 Career

My early teaching career from 1978 had primarily been as a secondary PE teacher. In Fife Region, I spent six years teaching PE in secondary schools while also studying for one year of a part time masters in education at Dundee University. Then, from 1984, having been granted a leave of absence, I taught PE for three years in Kuwait, two of which were as head of a department comprising seven UK-trained specialist teachers. Returning to Scotland in August 1987 my professional goal was to focus on my secondary PE career. However, in May 1987, I was informed there would be no secondary school posts available in Fife and that I could only be offered the position of peripatetic primary PE specialist teacher. I accepted this position as a short term option, fully expecting to quickly return to secondary schools, hopefully in a promoted post.

Initial Conditions in 1987: The Context

This section describes how key macro, meso and micro factors framed the professional context into which I returned to Scotland in August 1987.

The Macro Level

In 1987, the conservative party's UK election victory heralded a speeding up of their neo-liberal and marketisation agenda. Whilst the 1979 to 1986 period had been characterised by efforts to cut public spending and free labour markets, 1987 revealed clear signs to dismantle the welfare state and public sector, with education

one of the main targets. As such, many of the accountability and performativity measures that were to sweep through education for the next two decades had already been put in place. However, while Scotland had not embraced these reforms with the same fervour (Menter, 2005), there was still to be a noticeable shift in the focus of Scottish education from personal development to economic and social productivity (Hartley, 1987).

Within this macro context, PE remained low status in Scotland (Thomson, 1983) as it did across most of the world (Hardman & Marshall, 2000). In terms of secondary school PE, Scotland was in the process of developing its first national certificates. Based on a performance rationale, many in the PE profession thought this certificated route would help raise the status of the subject (Thomson, 2003), although others believed PE would be best served remaining in the curriculum for its 'core' participation role (Hoyle, 1985; Cairney, 2004). Primary PE, on the other hand, was heading in another direction as it was now to become included in the more aesthetically-oriented Expressive Arts subject area (SED, 1987), which placed it somewhat at odds with the strong performance rationale driving the secondary certificate. This divided view of PE was not new, tracking back to the 1950s when the male and female teacher training institutions were split along similar conceptual lines. During this earlier period, the females favoured the more aesthetic movement education approach (Laban & Lawrence, 1947), while the males concentrated their efforts on a performance and technocratic approach (Kirk, 1992). By 1987, movement education was only common in the early primary years, whereas secondary PE had become dominated by the skill-based multi-activity approach discussed earlier (Kirk, 2006). Fuelled by these two national developments, these

conceptual differences were now being revisited across the primary/secondary divide in Scotland. In addition, the low status of PE in general was greater for primary PE with many authors highlighting problems in initial training (Kerr & Rodgers, 1981), CPD (Mawer, 1983), specialist support (Whitaker, 1979; 1980), curriculum delivery (PEA, 1987) and marginalisation (Pollatschek, 1979). In addition, although specialist teachers had long been a feature of primary PE in Scotland (Mortimer, 1980), numbers were falling and in some areas there was no primary PE specialist support (SED, 1980).

Therefore, with the conservative government's accountability agenda aiming to raise educational standards, and with primary PE conceptually dislocated from secondary PE and marginalised within primary schools, the macro context in August 1987 was not the best environment in which to enhance my career prospects.

Meso Level

Although dismantling Local Education Authorities (LEAs) was a conservative party goal (Ball, 2008), Fife Region had considerable autonomy over its education system which, in my personal context, translated to a well-supported visiting primary specialist scheme for all the Expressive Arts, i.e. PE, Art, Drama and Music (Liddell, 1979). There were 18 primary PE specialists and five PE advisory staff who spent varying amounts of time supporting primary schools. In addition, the region had created its own primary PE guidelines (Fife Regional Council, 1980) with the result that primary PE in Fife compared favourably with much of Scotland (SED, 1980). However, with 150 primary schools across the region, each specialist was designated at least eight primary schools and was expected to teach every class in each school

once per month. In reality, the specialist would teach each class nine times per year. The approach for each school was top-down in nature with the primary PE specialist preparing lessons based on the Fife primary PE guidelines and then teaching a demonstration lesson with the class teacher in attendance. The class teacher would observe and then follow up with all the other PE lessons until the specialist's next visit, a month later. Crucially, time was not scheduled for additional liaison between specialist and class teacher and, as such, relationships were generally linear and passive on the part of the class teacher. In addition, the primary PE specialists were only able to meet with each other four times per year or once per term. As will be discussed, while an overview of the primary PE specialist scheme may have been quite impressive (Liddell, 1979), the reality was, from my perspective, quite different.

The Micro Level

On a monthly basis, I was expected to teach primary PE to all classes in eight different and unrelated primary schools across central Fife who fed into five different secondary schools. This equated to 2,000 children between the ages of four to 12 per month and 100, almost all female, class teachers. I was also to work in four special support units for children with hearing impairment, visual impairment, emotional and behavioural difficulties (EBD) and physical disabilities. The children and staff in these nine schools proved to be quite different, with the smallest school having 34 children and three teachers and the largest, 21 teachers and 440 children. While the primary PE equipment (e.g. balls, beanbags etc.) was similar, the facilities were diverse and ranged from two schools with gymnasia, three schools with multi-purpose halls of different sizes and two schools with a classroom area for PE. In

addition, timetabling for primary PE varied between one and three sessions per week, with sessions lasting between 20 and 90 minutes. In one school, the school hall was out of commission for almost three hours each day to accommodate two lunch sittings. These eight schools had been unfortunate to have had two different specialist teachers over the previous two years and a six month period in 1986 with no specialist support. I was the third PE specialist in three years and most of the head teachers, although friendly, did not engage me in any detailed discussion at our initial meetings. Most of the class teachers were friendly but passive, a small number resentful about the inconsistent nature of the primary PE support and another 5-10% saw my appearance as an opportunity to sit in the gym and carry out their marking/grading while I taught (babysat?) the children. Of the 100 teachers, only about 5% seemed particularly interested in primary PE.

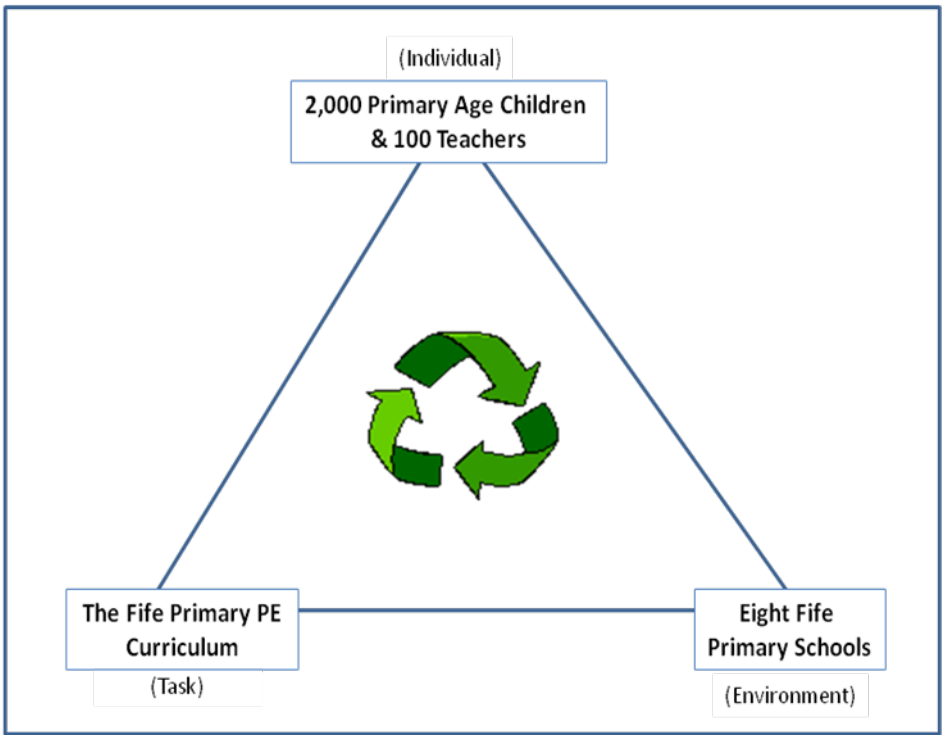

Figure 5.1 Initial Conditions: My Immediate Work Environment August 1987

Therefore, as I returned to Scotland in August 1987, the context into which I was about to work not only failed to match what I had expected, but seemed very disjointed. I found it difficult to fathom how teaching 2,000 children per month in eight disconnected primary schools could improve the quality of primary PE. As Figure 5.1 highlights, with primary PE marginalised in the macro national context, the immediate ecological context into which I was returning was very different to that of an aspiring principal teacher of PE in a secondary school.

Initial Conditions in 1987: My Capacities

Within this initial context, there was little indication that I possessed many of the personal capacities that would help me cope with or influence primary PE. As will now be discussed, my directional and integrating capacities were removed and limited for the task I was about to undertake.

Directional Capacities

Emotionally, I was not motivated to teach primary PE to 2,000 children per month. I had spent two successful years as head of PE and did not see any career pathway in primary PE, particularly as I was conscious that secondary teaching was of higher status than primary (Hargreaves, D., 2005). I was convinced my peripatetic primary PE role was short-term and expected to soon re-establish myself within the secondary PE community. However, I did have one concern that would impact on my future: I was uncomfortable with the primary PE guidelines (Fife Regional Council, 1980) which were supposed to be the basis of my primary PE teaching. An amalgam of movement education principles, the multi-activity secondary PE

approach and many pages of lesson plans, I could not, at the time, see what they were trying to achieve. Although I had no experience of teaching movement education, I was wary of its focus on aesthetic appreciation, creativity, exploration and graceful movement (Scottish Education Department, 1969), mainly because it seemed disconnected from the functional 'real world' of PE, sport or physical activity. Conversely, I had also become increasingly sceptical about the value of the traditional multi-activity secondary PE model with its focus on short-term 'coverage' of specific activity skills. While I had worked with colleagues in Kuwait to extend the range of activities (e.g. more health-related and recreational options), we had collectively lacked the knowledge and confidence to create an alternative vision around which to structure the secondary PE curriculum. Therefore, although I did not spend time considering these primary PE concerns in any detail, a seed of discontent had been sown as I was unable to connect with the vision being presented in the Fife primary PE guidelines.

Integrating Capacities: Knowledge and Relationships

With little experience of working with primary age children, my understanding of primary PE was at best limited. I had little knowledge of primary schools, primary teachers, primary children and the primary PE curriculum. Although I was a confident secondary PE teacher, I did not feel equipped to teach in the primary sector and was embarrassed about being considered a primary PE specialist. In addition, my lack of motivation meant that developing relationships was not high on my agenda. Two thousand children, 100 class teachers and almost 20 primary PE specialists was a large number of people to deal with on a regular basis. My contact with the primary schools was so limited that I imagined it would take years to

develop positive working relationships. As for my primary PE colleagues, I made a significant error of judgement during our early encounters. This group comprised of mostly female teachers, well-established in their roles and apparently well-versed in the movement education approach which had been consolidated in the previous national primary PE guidance 20 years previously (SED, 1969). My first three days back in Fife were 'In-Service Days' with my fellow primary PE specialists and instead of trying to work out my concerns with the primary PE guidelines over time, I made the decision to question their appropriateness. I received short shrift from the PE advisor in a private meeting who suggested, quite strongly, that as a PE teacher I should know more about the movement education approach. I then added to my problems by sharing my concerns about the guidelines with my primary PE colleagues. Given that many of my new colleagues had been part of the original curriculum guidelines writing team (Fife Regional Council, 1980), knew about my lack of experience in primary school and were aware that I wanted out of the primary role as quickly as possible, I was alerted to the inappropriateness of my observation. Not for the first, or last, time, I had put myself in direct conflict with the 'indigenous experts' who were the gatekeepers of the primary PE traditions I had identified as a problem. My return to Fife was not what I had envisaged!

Section Summary

Initial conditions for the DPEP in August 1987 were not good. I was about to work in a context where I would be teaching 2,000 children per month in eight unconnected primary schools across Fife. My motivation was low, my experience of primary schools was minimal, my primary PE knowledge limited, I had personal concerns about the PE curriculum guidelines and my immediate relationships had

been compromised by my initial observations. Add to these drawbacks the marginal status of primary PE and I did not feel I was on the cusp of an exciting innovation adventure.

5.3 Contexts across the Foundation Phase

This section considers the different contexts in which I worked across the foundation phase between 1987 and 2001. In particular, it focuses on the key macro, meso and micro factors which framed the nature of the different contexts during this period.

The Macro Context

While the macro events were removed from my personal work, the national and education policy landscapes as well as the status and nature of primary PE were all to impact on my curriculum innovation efforts.

Policy Context

Although the foundation phase started and finished in a left-of-centre Scotland which had on-going tensions with the more right-wing London government (Paterson, 1997), I spent almost all of the 1990s working in England. Consequently, the delivery of neo-liberal, market-driven, and 'restorationist' policies was in full swing as witnessed by significant central government control, less powerful local authorities and private sector models being introduced to the public sector (Ball, 2008). Further, while a policy shift was expected in 1997 following the election of New Labour, its 'Third Way' (Giddens, 1998) was to have more similarities with a neo-liberal agenda than with the social justice values of 'old' labour (Whitty, 2002, p. 127). Anti-conservative feeling ran high in Scotland across this phase, (Paterson, Brown & McCrone, 1992) and, following New Labour's constitutional reform plans,

had a significant influence on the creation of the first Scottish parliament for over 300 years. Early in the post-devolution period, just as I returned to Scotland, the Scottish Executive[7], on the basis of social capital principles (Curtice, McCrone, Park & Paterson, 2002), set out to create a new policy-making context which would '*cleave to liberal social values and social democratic welfare state attitudes which have been abandoned in England'* (Keating, 2005, p. 1). While my initial curriculum innovation efforts were compromised in the top-down policy context in England (Ball, 2008), my first two years back in Scotland from 1999 until 2001 saw the Scottish Executive putting in place mechanisms for a more inclusive and participatory policy-making process (Arnott, 2009). As it would turn out, this was to offer a significant opportunity for my personal curriculum innovation agenda.

Education

Education policy in England during the 1990s had a significant impact on my curriculum innovation efforts during the foundation phase. Arriving in England in 1991, radical educational reforms were being implemented in response to perceived low education standards (DES, 1988[8]). Schools were being allowed to 'opt-out' of LEA control and a national curriculum was being introduced based on a traditional subject-based approach (Ball, 2008, p. 83). The curriculum was being delivered in a competitive quasi-market context driven by independent inspections (Ofsted, 1992)

[7] The Scottish Government was known as the Scottish Executive when it was established in 1999 following the first elections to the Scottish Parliament. The current administration changed the name to Scottish Government after the elections in May 2007.

[8] In England, the Department of Education and Science (DES) was created in 1964, renamed the Department for Education (DfE) in 1992 and again as Department for Education and Employment (DfEE) in 1995. In 2001, the DfEE became the Department for Education and Skills (DfES), in 2007 the Department for Children, Schools and Families (DfCSF) and in May 2010 returned to being the DfE.

and national literacy and numeracy tests (Clark & Munn, 1997). These tests narrowed children's learning experiences (Ball, 2008) and were used to create league tables which compared schools and identified 'failing' schools (DfE, 1994). Local Management of Schools (LMS), based on business management models, was also introduced to ensure head teachers led their schools as businesses (Simkins, 2000). Subsequently, school culture began to change as teachers became increasingly perceived as 'technicians' as opposed to autonomous professionals (Ball, 2001). Management and leadership agendas increasingly focussed on senior figures within schools and resulted in teachers being bypassed as potential curriculum innovators. Other developments included LEAs being displaced as sole providers of state provision of education (DfE, 1994) and schools being able to go into partnership with private sector sponsors to focus on specialisms and raise standards, i.e. specialist schools (Ball, 2008). On its election, New Labour was to keep educational standards linked to the economic imperative of competing in the global economy (DfEE, 1997) and it was easier to identify the similarities with conservative education policy (Whitty, 2008). During my final two years in England (1997 until 1999), attention continued to focus on national curriculum, national testing and other issues from the 1998 Education Act, whilst the re-launching of the specialist schools programme (DfEE, 1997) actually extended the conservative quasi-market agenda by more closely linking secondary schools with business sponsorship (West & Pennell, 2002).[9]

While the education system in England changed almost beyond recognition during the 1990s, the relative independence of the Scottish system, aligned to its left-of-

[9] By 2010, there were approximately 3,000 specialist schools, 88% of the state-funded secondary schools in first England (DCFS, 2010)

centre civil attitudes, curtailed the London government's performativity agenda. In particular, many Scottish parents rejected the opportunity to question teachers' professionalism and the need for 'national testing' (Pickard, 2003). Whilst the 5-14 curriculum changes were generally accepted (SED, 1987), the government was forced to limit its aspirations by introducing voluntary national testing and scrapping league tables (Munn, 1997), although it did manage to manoeuvre a shift in the overall educational focus from personal development to economic and social productivity (Hartley, 1987). However, soon after I returned to Scotland in 1999, the new Scottish Parliament presented its first Education Act (Scottish Parliament, 2000), which included national education priorities to frame future development around a collective emphasis on improving equality and inclusion (Humes, 2003). The Parliament also endorsed the McCrone agreement on teachers' conditions of service (Scottish Parliament, 2001) which placed education '*on a firm footing by according values and status to teaching as a profession*' (Humes, 2003, p. 77). Consequently, this immediate post-devolution period included policies which accentuated the differences between Scotland and England and set the framework for much of what was to follow (e.g. Scottish Executive, 2004a).

Primary PE

From a personal perspective, however, although there may have been signs of some potential change in the future, the majority of the foundation phase was spent working in a context in which bottom-up curriculum innovation in the marginal curriculum area of primary PE did not appear to be on anyone's education agenda, except mine. Throughout the late 1980s and 1990s, while primary PE remained marginalised, the contrasting approaches to national curriculum in England and

Scotland resulted in key differences in primary PE. In Scotland, subsumed within Expressive Arts (SOED, 1992), primary PE retained its aesthetic orientation, locking into the multi-activity movement education approach highlighted in the Fife guidelines. The more traditional approach in England, however, sent primary PE on a different trajectory (see table 5.2) by simply focussing on a multi-activity approach which privileged team games (DES, 1992) and connected to the conservative party's sport agenda (Penney & Evans, 1999). Personally, it was particularly disappointing that young children (aged 4 to 7 years) were to be taught six different physical activities (DES, 1992), far removed from the more holistic approach I was seeking to develop (Jess, 1990).

Table 5.2 Macro Level Factors Influencing Primary PE in England during the 1990s

- A top-down, controlling central government (Ball, 2008)
- The continued marginalisation of primary PE within PE (Mason, 1995)
- The compartmentalised multi-activity PE National Curriculum (DES, 1992; PEAUK, 1995)
- The rapid move towards a traditional 'restorationist' sport agenda (DoNH, 1995; YST, 1996)
- The lack of primary PE specialists across the country (PEA, 1987; Carney & Armstrong, 1996)
- The marginal role of the PE professional associations (Houlihan & Green, 2006)
- The increasing dominance of literacy and numeracy agendas in the primary school (Beard, 2000; Shuayb & O'Donnell, 2008)

Further, with PE of limited interest to education policy makers (Houlihan & Green, 2006), the government began to push a traditional sport agenda (Evans, Penney &

Bryant, 1993). Acknowledging poor physical activity levels (Armstrong, Balding, Gentle & Kirkby, 1990) and limited sporting success (Houlihan & Green, 2006), a 'restorationist' sport policy was presented (Department of National Heritage, 1995) and John Major, the Prime Minister, promised to '*put competitive team games at the heart of school life*' (cited in Carney & Armstrong, 1996, p. 69). Central to this traditional sport revival was the Youth Sport Trust (YST) which was created in 1994 with the aim of developing and implementing PE and sport programmes for young people. The YST rapidly came to prominence by supporting the government's sport policy and articulating the value of school sport (and PE) in relation to the whole school improvements to which the government aspired. Conversely, the PE professional associations, reluctant to follow such narrow sporting priorities, were effectively excluded from the national policy discourse (Houlihan & Green, 2006). Further, with education, PE and school sport policy continuing on a similar trajectory, New Labour set out to 'outshine' the previous administration's commitment to elite sport (Houlihan, 2000), presenting it as a catalyst to tackle social exclusion, community cohesion, health and obesity, crime and anti-social behaviour (Coalter, 2008; Collins, 2010). As such, '*the fortunes of school sport and PE...were transformed*' (Houlihan & Green, 2006, p. 73) as it received substantial financial support from central government over many years (e.g. in 2003 PE and School Sport received over £1 billion of government money (DfES/DCMS, 2003)). However, when I left England in 1999, although PE appeared to be of high profile, its raised status was primarily linked to an elite sport agenda. In reality, PE curriculum time had been eroded, particularly in primary schools (Speednet, 1999), and the National Association of Head Teachers (1999) identified a lack of suitably competent and

confident staff because of inadequate training time and reduced advisory and CPD support. Although I was uncomfortable with this sport focus, I had particular concerns about the superficial, 'tips for teachers' approach taken by the YST's nationally disseminated TOPS programme which was designed to create a sport development pathway for young people (YST, 1996). As such, although I arrived in England in 1991 unaware of the impact of policy, by the time I left in 1999, I acknowledged that this approach to national policy-making and dissemination was unlikely to accommodate my personal curriculum innovation aspirations.

My return to Scotland, however, proved just as depressing. Throughout the 1990s, the attention of the PE profession had been firmly focussed on the secondary school national certificated courses (Reid, 1996a; Thorburn, 1999) and resulted in the continued marginalisation of primary PE (Carney & Guthrie, 1999). In addition, the Scottish PE Association (SPEA), the country's sole professional PE body, ceased to function in 1999, leaving the profession without an advocacy 'voice' (Kirk, 2006). Sport, however, remained a key feature on the PE landscape. The Scottish Sports Council (soon to become sportscotland) had introduced a School Sport Coordinator Programme for secondary schools (Coalter & Thorburn, 2002), in conjunction with a pilot of the Active Primary School Programme, both of which were forerunners of the national Active Schools Programme (sportscotland, 2008). Nevertheless, during my first two years back in Scotland, primary PE remained in its marginal role within education and PE (Hardman & Marshall, 2000).

The Meso and Micro Contexts

Within these two contrasting national contexts, there were significant differences between the three meso contexts in which I worked. Fife Region, as a local authority, was bound to deliver education to all its children and young people, MMU, as a new university in 1992, was primarily focussed on undergraduate student teaching (MMU, 2006), while Edinburgh University was a well-established, internationally-renowned university with a strong emphasis on postgraduate teaching and high quality research outputs (University of Edinburgh, 1999a). The biggest difference between these three meso contexts was the expectations in terms of teaching time and innovation/research work. In Fife, the local authority took the view that primary PE specialists should teach every class in all primary schools (around 25 hours per week), use its primary PE guidelines and have no designated consultation time with the class teachers who would teach PE for the three weeks the primary PE specialist would not be at the school. As such, there was limited expectation that primary PE specialists would engage in innovation work of any significance. At MMU, while there was some expectation that lecturers would engage in research and scholarly activity, the teaching timetables with undergraduate students were relatively high, i.e. between 16 and 18 hours per week in 1992, often including particularly large groups. In contrast, at Edinburgh University the teaching hours were much less, around 12 per week, but there was an expectation that lecturers would engage in academic and innovation work to publish papers in high quality journals. Subsequently, at the meso level, expectations in relation to my curriculum innovation efforts were quite different across the phase. In particular,

there was a significant difference between the top-down delivery expectations in Fife and the more development-oriented ethos of the universities.

However, and significantly, the relationships between the three meso level contexts and the specific micro contexts in which I worked appeared out of sync with each other, although the marginal status of primary PE was a constant. In Fife, while the local authority supported one of the largest visiting specialist schemes in the country (Liddell, 1979), PE remained marginal in all the primary schools in which I worked (Jess, 1992). Teaching for between one and three days per month in eight different schools and teaching on average six different classes every day was termed the 'sausage factory' syndrome by the PE specialists and, because of the limited contact with primary colleagues, resulted in feelings of isolation. Any impact I had beyond the gym hall was extremely limited. At MMU, while the university was primarily focussed on undergraduate teaching, the sport science department, in which I worked, was making concerted efforts to become one of the highest rated sport science research departments in consecutive UK Research Assessment Exercises. Consequently, between 1992 and 1996 progress from a three to a four star department resulted in the transition to a top level sport science department, offer numerous professorial and postgraduate posts, and also receive millions of pounds for new PE and laboratory facilities[10]. As Professor Burwitz, the head of department, reported in the Times Higher Education Supplement in 2003, '*We are the jewel in the crown of our institution, which looks to us to give lead and guidance.*

[10] Following the early success of the Sport and Exercise Department, which included an extensive building project, MMU's Alsager Campus was sold in 2006 and, by 2010, the department was divided between campuses in Manchester and Crewe.

In the 1992 RAE we were rated 3, in 1996, 4, and in 2001, 5, so others want to know how they can get there*' (cited in Ingram, 2003). As such, although the department at the micro level did not necessarily connect with the main teaching focus of the university, it was highly rewarded for its research and development efforts. From a PE perspective, although the small number of staff were removed from the university's education department (based six miles away in Crewe), they benefited from the sport science department's success with the return of an undergraduate secondary PE programme, more PE staff members being appointed and tangible support for applied interdisciplinary development projects, which were a strong focus of the department's research agenda (Burwitz, Moore & Wilkinson, 1994). From a personal perspective, the ambitious nature of the department proved to be helpful for my developmental PE agenda. During my first few years at MMU, working closely with the undergraduate B.Ed. primary education students studying primary PE as a 'main subject'[11] (Carney & Armstrong, 1996), I was encouraged to create motor development and developmental primary PE courses, even although neither were inline with the PE national curriculum (DES, 1992). Further, as will be discussed later, I was also actively supported to develop and manage the Child Movement Centre (CMC), which I set up in an attempt to raise the professional and academic status of children's movement development. In addition, I was also supported to begin my PhD in 1997, a move that not only re-oriented my career in a more psychological and scientific direction, but introduced me to a more academic and research-inclined culture which focussed on high quality peer-refereed publications and grant applications. Therefore, although primary PE remained on the

[11] Although training to be primary teachers, these students attended approximately 200 hours of PE in each year of their programme.

margins within the MMU context, the academic aspirations of the department led to both active and tangible support which further fuelled my curriculum innovation efforts.

However, when I was offered the opportunity to return to Scotland in 1999 to work in a senior position at the country's only higher education (HE) PE department at the University of Edinburgh, it was too good an opportunity to pass over. It was a return to a mainstream PE context, a move to a traditional academic university, where my PhD supervisor had recently moved as head of the department, and an opportunity for my family to return to Scotland. At the meso level, with the university aiming to be *'a leading European centre of academic excellence' (*University of Edinburgh, 1999a), I believed I was being offered the opportunity to build on my MMU experiences and also to connect with like-minded PE colleagues (Fullan, 1993). However, at the micro level, I found the PE department, situated on the outskirts of Edinburgh, to be inward-looking and removed from the national scene, although it was the only institution involved in undergraduate secondary PE teaching in Scotland. This situation was, in part, the result of turbulent merger experiences during the 1980s (Thomson, 2003) which had seen the department move from being a confident stand-alone PE college with a significant input to the national curriculum development portfolio (Thomson, 2003) to a department within Moray House College, which itself had merged with Heriot Watt University in 1991 and then the University of Edinburgh in 1998. On my arrival, the large PE staff was almost solely committed to the undergraduate B.Ed. PE programme which focussed on training secondary PE teachers. CPD, research activity and academic or professional writing were at a minimum (see Reid, 1996a; 1996b; 1997; Brewer &

Sharp, 1999 for exceptions) and no member of the team was enrolled for a PhD. While I was to continue my psychology-related PhD studies, my lecturing during this period was entirely focussed on the B.Ed. in secondary PE. Although this degree enabled students to teach PE in both primary and secondary schools, the focus of the programme was the traditional secondary PE curriculum with primary PE only studied as part of the first year. My main teaching role was to oversee the PE Curriculum (PEC 1) course which prepared students for the short primary school experience at the end of the first year. The structure of this course had been the same for many years and involved in excess of 200 student contact hours, delivered by 14 different members of the PE lecturing staff. It was focussed on a traditional multi-activity upper primary early secondary PE curriculum (University of Edinburgh, 1999b). The introduction to the course for most of the first term was team games, i.e. football, rugby, basketball and hockey. While I was able to introduce a short early years developmental section, none of the staff members were interested in this approach and, for many years, the course was delivered in two discrete sections: the generic, developmental section and the traditional multi-activity section. My initial return to Edinburgh was not encouraging. Frustratingly, my developmental agenda was yet again isolated and, during my first two years back in Scotland, there was little evidence that this situation would change in the immediate future.

Section Summary

This section has highlighted how the different macro, meso and micro contexts in which I worked across the DPEP foundation phase resulted in the overall context for my curriculum innovation efforts being ambiguously bounded. At the macro

English and Scottish contexts, primary PE had been marginalised, although both offered different curriculum approaches. Further, while each of the immediate contexts offered me a significant degree of autonomy to explore the edge of chaos possibilities of my developmental movement agenda, it was the sport science context at MMU that was most supportive. Ironically, it was the PE context in Edinburgh that proved to be least supportive. Nevertheless, although marginalised, these different contexts, as will now be discussed, gave me the opportunity to develop a number of the key personal capacities I would need to consolidate and extend my developmental PE agenda during the delivery phase.

5.4 Developing Capacities across the Foundation Phase

Set within these different contexts, the experiences I met over the 14 years of the foundation phase had a significant impact on the development of my personal capacities to cope with and influence the curriculum innovation process. As such, the section explores the development of those directional and integrating capacities that helped focus, guide and integrate my innovation efforts during the 1987 to 2001 period. Specific consideration will first be given to the emotional, reflection and inquiry skills that helped support the development of my vision for developmental PE and also integrate my developing knowledge and relationships to give some coherence to my curriculum innovation efforts. It is important to reiterate that this exploration is a retrospective exercise and, although it was my intention to impact upon the curriculum innovation process, I did not purposefully set out to focus on the development of these personal capacities during this period.

Directional Capacities

The first few years of the foundation phase were personally distressing and resulted in my emotional and reflective capacities being to the fore as I tried to cope with my situation and endure a period which had neither focus nor direction. However, through a combination of luck, resilience, inquiry and experimentation these feelings began to change and, by 1990, I was considerably more focussed.

Emotions

Although my DPEP experiences have been enjoyable and challenging, the first two years of this experience were so emotionally distressing they had a significant impact on much of what was to follow, mainly by keeping my level of expectation quite low. While the early part of my career, from 1979, had been focussed on trying to secure a promoted post, which I achieved in Kuwait, returning to Fife as a primary PE specialist was emotionally difficult. However, the period between 1987 and 1989 got worse and I became very unsettled and, at times, depressed. While my first four months back in Scotland were spent half-heartedly teaching primary PE, they were followed by a secondment to a secondary PE department which I assumed would result in a permanent move back into secondary schools. However, by the summer of 1988, my secondary PE teaching career came to an abrupt end. The first signs of trouble were when the Regional PE Adviser informed me I had been extracted from an interview list for a promoted post by the authority because I had worked abroad and would need to teach for two years in secondary schools before I would be considered for promotion. Any aspirations of quickly building on my head of PE role in Kuwait were extinguished. Worse was to follow in mid-1988 when I was

unsuccessful in three consecutive interviews for secondary PE teacher posts in Fife, two of which were offered to final year students who had not yet graduated. This was the unforeseen 'Catch 22': no interview for promoted posts until I taught two years in secondary schools, but I was unable to get back into secondary schools. August 1987 may not have been a good starting point, but the summer of 1988 was an emotional low. The year had been a significant setback and I had no option but to head back to my role as a primary PE specialist. The 1988-89 school year was a salutary experience, particularly as I was not invited back for another secondary PE interview. I became even more de-motivated, lacked confidence, acknowledged I had limited primary PE knowledge, was largely isolated in my schools and was unclear about how to work with class teachers or track children's progress. In addition, I struggled to connect with the Fife primary PE Guidelines and grappled to understand, with increasing frustration, how teaching 100 classes in eight disconnected primary schools each month could be an effective model to develop primary PE. These two years were simply the unhappiest and most demoralising period of my career.

In September 1988, in my desperation, I made the decision to enrol in a new PE Masters programme at Glasgow University in the hope that it might, in some way, help resurrect my career. This proved to be one of my key 'bifurcation points' (Biesta, 2008) as I could have made one of many logical decisions at this point. Initially, I was convinced I had made the wrong decision because the programme had a strong science focus and was not only hard to understand but also difficult to contextualise in the school setting. However, the turning point came early in 1989 when one of the courses, motor development, not only helped me develop a much

better understanding of primary children, but led me to David Gallahue's motor development and developmental PE literature (Gallahue, Werner & Luedke, 1975; Gallahue, 1982; 1987). As will be discussed in more detail later, this work offered primary PE curriculum and pedagogy advice which appeared to make sense and connect to my own beliefs about PE. It was an 'aha' moment (Pithouse et al., 2009) after which things began to change. Emotionally, over a short six month period, I made the transition from being de-motivated and directionless to being focussed and fascinated. Over the summer of 1989, I made the tentative decision to re-orient my career towards primary PE. Linked to this decision, another of the Masters courses, sport and exercise psychology, inadvertently turned out to be a significant support in helping me consolidate my career re-orienting decision. In particular, key concepts from the motivational orientation section of the course resonated with my own professional situation (Nichols, 1984). Specifically, the literature on task and ego orientations helped me understand that focussing on the task at hand was more likely to lead to positive affective responses in terms of higher motivation, more perceived control, appropriate attributions and less anxiety (Fox & Biddle, 1989). This task orientated approach was quite different from the ego orientation which had seen me trying to be better than everyone else to get promoted. At this time in my professional life, I was ready (and needed) to stop worrying about being more successful than my colleagues and to focus my emotional energies on understanding curriculum and learning more about children, teachers, curriculum, pedagogy and environments. Therefore, the PE Masters had inadvertently led me to the developmental PE and the psychological knowledge, which together, gave me both the conceptual and emotional focus to re-orient and sustain my new career pathway.

The next 12 years of the foundation phase, and the delivery phase, remained mostly task-orientated. At 35 years of age in 1990, I had found a subject area which motivated and interested me and, although it was on the margins of PE, my move to higher education allowed me the opportunity, or luxury, of studying this area from different academic, research, professional and entrepreneurial perspectives. This is not to suggest I lost my ego-orientation. As I became more successful over the next decade and my confidence began to return, my desire to extend my curriculum innovation ideas to a wider audience grew accordingly. Unfortunately, as noted earlier, the policy context in England proved impenetrable and my frustration would return. Nevertheless, at the micro level my capacity to remain 'on task' became a key feature of my work and would prove to be an important component of my long-term engagement with the DPEP.

Reflection and Inquiry

During the initial period of my primary PE curriculum innovation efforts, my unhappiness seemed to be expounded by my reflection and inquiry skills, as the more I reflected on my experience, the more I felt on a downward spiral. In the aftermath of my interview failures and enrolment in the PE Masters at Glasgow, I continued the second half of 1988 in an emotional low trying to engage with a teaching job I did not want and working with a knowledge base that was not, in my view, 'fit for purpose'. In addition, the scientific PE Masters material seemed to bear no relationship to my job as a teacher. Therefore, with a disconnected and marginalised job and no apparent means of developing the knowledge base to move my teaching forward, the more I reflected, the more I could not see a way out. Reflection and inquiry did not seem to be helpful at this point.

However, as with my emotions, my outlook changed once I discovered the motor development and developmental PE literature. Not only did I get my motivation back, I also began to engage in an upward and increasingly connected spiral of reflection and inquiry which began the re-orientation of my career. As I started to focus on building a knowledge base around young children's motor development and primary PE, I began to feel emotionally stronger and increasingly engaged in more practice-related reflection and task-oriented inquiry. It was a significant transformation and, as I will discuss below, my inquiry and work-based reflection helped me begin to create a clear personal vision of developmental PE, engage with a new literature base, make efforts to connect a more holistic developmental theory with my practice and increasingly experiment with different curriculum and pedagogy approaches. Gradually, my curriculum innovation efforts developed into a long term reflective and inquiry-based project as I began to grapple with the marginal status of primary PE and seek to build a more appropriate knowledge base around children's motor development and developmental PE. Over the next decade I was to make a number of career changing/bifurcation decisions based on my professional reflections and related engagement with an inquiry process aimed at developing a more appropriate knowledge base to support my primary PE curriculum innovation efforts. As will be discussed later, my decision to leave Fife was largely based on my reflections on the top-down, disconnected and marginalised nature of my primary PE role. My decision to create the Child Movement Centre (CMC) in 1993 in Alsager was based on my reflections on, and inquiry about, primary PE practices in England, as was my decision to re-orient my career to undertake a psychology-related PhD in 1997. In addition, critical reflection became a key feature of my

professional and academic work as a part of my (initial teacher training) ITT observations in schools, my own academic and professional courses with students and also the Professional Development Review (PDR) scheme formally introduced at MMU in 1994. The PDR scheme proved particularly helpful as it encouraged me to identify my strengths and weaknesses and also to consider ways forward. As I became more confident and more focussed on developmental PE, these reflection experiences increasingly helped me create opportunities for on-going learning and inquiry (Stoll, Fink & Earl, 2003).

Working in higher education, I was increasingly encouraged to adopt an inquiry approach to extend my knowledge and understanding around the area of developmental PE. This process became highly motivating and successful in the early period of the DPEP as it helped me engage with the motor development and developmental PE literature, attend numerous primary PE conferences in the USA and consolidate my vision for developmental PE. However, the limited academic literature on primary PE, and early years primary PE in particular, soon became a significant barrier to the focus of this ongoing inquiry process and, in particular, on my academic career in terms of any PhD study focussed on early years primary PE. Consequently, based in a sport science department, I took the pragmatic decision to study for a PhD in developmental psychology by focussing on children and young people's competence and participation motivation, in an attempt to create a more robust case to support my views on children's basic movement competence (Jess, Collins & Burwitz, 1998). However, while this PhD effort progressed, I increasingly

moved away from curriculum and pedagogy inquiry; a move that would cause problems in the future.

Therefore, by 1999, ongoing inquiry and reflection had become key influences on my professional and academic life and were central in my decision to re-orient my career pathway away from early years PE curriculum innovation.

Vision Making

A personal vision for education is not only an important part of our capacity building to cope with and influence change (Senge, 1990), it also gives meaning to our work (Fullan, 1993). From a personal perspective, although I had always gravitated towards an inclusive view of PE, in the early part of my career I usually found myself at odds with the dominant PE culture that focused on the multi-activity model which tended to favour the more able pupils, particularly boys (Kirk, 2006). However, I was conscious (and often reminded) that although I had voiced a need for change I had been unable to articulate what this change should be and how it would impact on practice. Subsequently, during the first two years back in Scotland, between 1987 and 1989, my lack of clarity was accentuated by my low motivation, unwillingness to engage in any meaningful reflection or inquiry and my limited primary PE knowledge. However, during early 1989 my introduction to the work of Gallahue (Gallahue, Werner & Luedke, 1975), Seefeldt and Haubenstricker (1982) and Graham, Holt-Hale and Parker (1980) presented me with a novel developmental rationale for early years primary PE as the foundation for lifelong engagement in physical activity (Jess, 1990). In particular, Gallahue, Werner & Luedke's writing

captured my imagination by highlighting how children 'learn to move' but also 'learn through movement' (Gallahue et al., 1975, p. vii). Their book, 'A Conceptual Approach to Moving and Learning' (Gallahue et al., 1975) not only introduced the fundamental movements that underpinned children's future participation, but also discussed how critical children's cognitive, social and emotional development was to their on-going participation. Although these concepts are now a core part of Scottish education (Scottish Government, 2009), the developmental domains were new to me in early 1989, as was their clear explanation of the range of teaching styles that included exploration, guided discovery and command. In a very short space of time, the key concepts from this developmental PE approach would have a significant impact on both my thinking and practice.

However, while this developmental vision became increasingly popular across North America in the 1990s (e.g. NASPE, 1992; Barrett, 1992), and also had some limited influence in Scotland (Moray House College of Education, 1987; SOED, 1992), this was not the case in England. Although the English national PE curriculum was presented in developmental stages, it was based on a top-down multi-activity model (Penney & Evans, 1999) primarily focussed on team games (DES, 1992). Consequently, while I spent much of the early 1990s refining my developmental vision for early years PE (Jess, 1994), I was increasingly at odds with the dominant national policy vision, particularly when the YST began to monopolise developments (YST, 1996). Although I was unaware of it at the time, this incompatibility is a common feature of many innovation efforts (Rogers, 1995). Subsequently, when I made the decision to move away from primary PE in the late 1990s, I entered a sustained period of further inquiry and reflection, as I re-examined my

developmental vision in light of the new knowledge, new experiences and different contextual factors that fed back to influence my thinking.

Subsequently, from 1996 onwards, I set out to build a more convincing case for a developmental approach to PE, sport and physical activity. This new vision aimed to clearly articulate how children's movement foundation underpins a more extended and long-term view of developmental PE (Jess, et al., 1998; Jess & Collins, 2003). Based on Harter's (1978) competence motivation theory, this revised vision contextualised the proposal that those who believe they have performed a task well will feel competent and will be more likely to want to repeat this task in the future. In addition, Harter proposed competence motivation is not a singular cause-effect construct but multi-faceted and influenced by different developmental factors. In particular, she believed that children's perceptions of their competence are central to their participation in achievement-oriented activities, with their actual competence and feedback from significant others being key precursors of perceived competence.

With these points in mind, my extended vision for children's basic movement competence was built around the proposal that, apart from compulsory school PE, as children get older, they make their own decisions to be physically active or not. The key factor influencing participation is therefore psychological, although biological, social and environmental factors may, at times, by-pass the choice element (e.g. injury, lack of equipment or religious beliefs (Fox, 1988)). For older children and adolescents, who are developmentally more mature and leading more complex lives, identifying those factors influencing their physical activity decisions is a complicated process (Welk, 1999). However, for younger children, developmentally less mature

and leading less complicated lifestyles, there are fewer factors to influence their participation decisions. Subsequently, these early childhood years appear to be an appropriate time to identify and influence those key factors that influence current participation and act as the foundation for long-term engagement in physical activity. From this early years perspective, it was the developmental nature of competence motivation that was critical to the case for basic movement competence (Jess, 1998). While older children and adolescents more accurately evaluate the relationship between their actual and perceived competence, younger children consistently have much higher levels of perceived competence in relation to their actual competence (Ulrich, 1987; Dweck & Leggat, 1988; Nicholls & Miller, 1983; Stipek, Recchia & McClintic, 1992). Critically, this high perceived competence would appear to be the key factor in the participation process as it connects to an internal locus of control, a heightening of positive affect and the seeking out of challenging experiences in the future, whilst low perceived competence more likely leads to extrinsic orientation, negative affect, the seeking out of inappropriately high or low challenges and low future performance expectations. Put simply, those with high perceived movement competence are likely to be more willing to participate than those with low perceived movement competence (Horn & Harris, 1996).

This extended vision of basic movement competence thus revolved around the notion that because young children's perceived movement competence is likely to be high, participation is unlikely to be a significant problem. However, if early childhood PE experiences do not help children develop appropriate levels of basic movement competence, as they grow older their competence perceptions become more accurate

and they are more likely to develop low perceptions of their competence that lead to low levels of competence motivation and the greater likelihood they will drop out.

Harter's further proposal that feedback from significant others is key to children's self-perceptions adds more support to the case for basic movement competence. Developmentally, she suggests young children will take parental and teacher feedback at face value, which, when positive and linked to the children's high perceptions, enhances their positive attitude to physical activity (Harter, 1982). However, from late childhood into adolescence, the peer group becomes a key feedback source and increasingly impacts on young people's psychological development in terms of the availability of social opportunities, friendships and self-perceptions (Adler, Kless & Adler, 1992). Specifically, young adolescents with low basic movement competence are now comparing themselves with peers who may be more competent, which may lead to lower perceived competence, diminished competence motivation and more likelihood of drop-out. Therefore, this extended vision of basic movement competence as the foundation for lifelong physical activity built on the initial developmentally appropriate and inclusion principles by articulating connections to perceived competence and sources of competence feedback. Significantly, I realised that by only focussing on a narrow age range, my initial curriculum innovation efforts had been too restricted to create a persuasive argument to influence a wide enough audience.

Therefore, while I began the foundation phase unable to articulate a clear vision for early years PE, my experiences throughout the phase helped me begin to *'take a stand for a preferred future'* (Block, 1987, p. 102) and had led me to examine and re-examine this vision as I engaged with new knowledge, reflected on new experiences,

different contexts, and experienced various rejections and failures. In fact, as this vision became clearer and more robust, my main concern, having returned to Scotland, was that I would never get the opportunity to see the vision in action again.

Entrepreneurialism

While my personal vision was heavily influenced by on-going inquiry and reflection, my experiences consistently highlighted that the marginal status of primary PE, and particularly my developmental PE approach, were a significant barrier to the progress of my innovation efforts. I became increasingly aware that unless I could find the financial support to free up my time, particularly in relation to the large student cohorts I was teaching, I would be unable to create the space to focus on my curriculum innovation project. During my time at MMU, I was unwittingly introduced to the concept of non-profit making entrepreneurialism, a concept that has had a significant impact on the long term vision of educational innovation. Although I have only recently discovered this term in the literature (Smith & Petersen, 2006), since 1994 my developmental and inclusive principles have been balanced with the need to finance my innovation efforts. As such, I identify on a much smaller scale with Smith and Petersen's observation that educational entrepreneurs are '*visionary thinkers who create brand new for-profit or non-profit organizations that seek to have a large-scale impact on the entire public school system - and in so doing, redefine our sense of what is possible in public education*' (Smith & Petersen, 2006, p. 147). While I was originally concerned that the CMC project would follow a for-profit business model at the expense of the curriculum, professional and academic development, I soon realised I had developed a narrow perception of the relationship between finance and educational change. Since then,

and particularly because of the marginal status of primary PE, I have been conscious that while most of my innovation efforts have been driven by egalitarian and inclusive principles, I have also needed to secure the funding to enable the projects, as non-profit making endeavours, to occur in the first place.

Section Summary

During the foundation phase, my directional capacities changed beyond recognition. Two years into this phase I was de-motivated, lacking confidence and had no idea how to move my career forward. However, as has been discussed, a series of events, some luck and some hard work, came together to gradually turn this situation around. By the end of the phase in 2001, my developmental vision had evolved, my confidence had returned, my task-orientation was aligned to an on-going inquiry and reflection process and I had secured almost £200,000 from sportscotland to develop Basic Moves, as my curriculum innovation was now called: my curriculum innovation agenda was now focussed and about to move forward.

Integrating Capacities

With limited capacity to initially engage with the primary PE context, it was not until 1989 that my investigation of the developmental primary PE literature helped improve my emotional mindset and trigger the start of my developmental vision for primary PE. It was only then that I began to seek out the opportunity to build the knowledge and relationships that would connect the components of my evolving innovation agenda. As the foundation phase progressed, I actively tried to integrate developmentally appropriate principles into my work and, as a result, continued to extend my knowledge base and, slowly, develop professional relationships. This

section considers the knowledge and relationships that helped connect my efforts during the foundation level.

Knowledge

With limited initial knowledge, early years PE marginalised and an interest in a North American developmental PE model that did not sit comfortably with the dominant UK approaches to primary PE, my efforts to create a developmentally appropriate knowledge base were both a protracted and often isolating experience. My initial developmental knowledge building activities concentrated on the developmental characteristics of the children, particularly their psychomotor development, and the implications of these for curriculum and pedagogy. Latterly, however, as this knowledge base became increasingly disconnected from the dominant multi-activity approach to primary PE curriculum in England, my knowledge building efforts moved away from curriculum and pedagogy to concentrate on the developmental psychology and physical activity participation literature that would help me extend the basic movement vision.

The Developing Child

Between 1989 and 1996, my Masters studies, teaching, lecturing and the activities of CMC (to be discussed later), helped me develop a much better understanding of the developing child in relation to primary PE. Although this knowledge was primarily focussed on psychomotor development (e.g. Gallahue, 1982), I was also able to develop a more integrated knowledge base by investigating the impact of key cognitive, social and emotional factors on early years PE.

The psychomotor knowledge, almost all of which was completely new to me, helped support the developmental primary PE vision as I gradually added to my understanding of the two related psychomotor factors: the structural and movement-related development of the child (Espenschade & Eckert, 1980; Gallahue, 1989). As I developed an understanding of a child's growth and maturation from conception to adolescence, I became particularly intrigued by the impact in early childhood (Gallahue, 1989; Haywood & Getchell, 1993) of :

- the changing relationship between the different proportions of the body as the head and trunk get relatively smaller and the limbs proportionally longer, and its impact on balance
- the large increases in strength between the ages of three and six which sustains longer bouts of activity
- the developing myelination process which sheaths the neural pathways and facilitates better movement control

This background knowledge raised my confidence in my teaching, as I now began to understand how structural factors impacted on children's movement potential and started to have more appropriate expectations of young children's movement in physical contexts. I was now able to grasp the implications of the oft quoted '*children are not miniature adults*' (NASPE, 1992, p. 2).

However, the information with the greatest impact was that which challenged the long held misconception that young children's fundamental movement development 'just happens' (Gessell & Ames, 1940). Gallahue and others presented two key

proposals that were to have the most significant impact on my curriculum innovation efforts over the next 15 years. First, they highlighted how young children's fundamental (or basic) locomotor, manipulative and stability movements (see Table 5.3) develop from an immature, restricted and uncoordinated emergence in early childhood into the more mature, integrated movements which act as the foundation for the more complex physical activities they meet across the lifespan (Gallahue, 1987). The developmental nature of these fundamental movements was supported by movement-related criteria for each developmental stage which had been accrued over many years of motor development research (e.g. Wild, 1938; Wickstrom, 1978; Roberton & Halverson, 1984). However, and critically, because these efficient movement patterns do not 'just happen' through maturation, most authors also presented a more holistic picture of fundamental movement development which recognised the role played by children's psychomotor, cognitive, social and emotional development (Bloom, 1956), the informal opportunities for movement engagement and the quality of the movement teaching received (Gallahue, 1987). With my existing knowledge and experience based on the specific content of different PE activities, this background information not only filled a knowledge gap, but added to my belief that primary PE programmes, focussed on the sampling of short disconnected activity 'blocks', were unlikely to help children develop the appropriate fundamental movement foundation.

Table 5.3 Examples of the Fundamental Movements (adapted from Gallahue, 1982)

Locomotor Movements	Manipulative Movements	Stability Movements
Walking	Ball rolling	Axial movements
Running	Throwing	Bending
Jumping	Kicking	Stretching
Galloping	Punting	Twisting
Leaping	Striking	Turning
Skipping	Bouncing	Upright balance
Hopping	Catching	Inverted balance
Climbing	Trapping	Rolling
Swinging	Dribbling	Stopping
		Dodging

Subsequently, as my developmentally appropriate vision grew, this developmental knowledge base presented the underpinning background information that gave me the confidence to explore the edge of chaos possibilities and fuel my commitment to continue down this path.

Developmental Curriculum and Pedagogy

Connected to this background information, developmental PE programmes were being created an introduced in North America (e.g. Graham et al., 1980). These curriculum efforts were mostly focussed on how the technical criteria for the fundamental movements could be integrated with the movement concepts to help children be more adaptive and creative in their movement performance (see Table

5.4). With my experience of teaching early years PE concentrated on short blocks of games, gymnastics and dance, which did not appear to impact on children's learning, I found this approach compelling because it presented a more logical generic rationale. Fundamental movements and movement concepts were the core learning that children needed to set the foundation for their current and future participation. I had to acknowledge, however, that movement concepts, central to the Movement Education approach, had never been part of my teaching because I considered their non-technical focus too nebulous and uncertain. I now recognised that children needed to develop movement that was technically competent, adaptable and creative and therefore accepted, perhaps grudgingly, that movement concepts were one possible way to achieve this movement foundation. From a holistic perspective, these movement concepts represented the cognitive, social and emotional factors that enabled children to effectively apply their movement performance in different contexts, e.g. games, gymnastics and dance (Graham et al., 1980).

Table 5.4 The Movement Concepts

SPACE (Where)	EFFORT (How)	RELATIONSHIPS (Who/What with)
Space Self-space General space **Directions** Forward Backward Sideways Diagonal **Pathways** Zigzag Curved Straight **Levels** High/medium/low .	**Speed** Fast/slow Gradual/sudden Erratic/sustained **Force** Heavy/strong Light/soft **Flow** Smooth/jerky Bound/free	**Body Parts** Know and identify Body shape Wide/narrow/twisted Symmetrical/asymmetrical **Objects** Over/under/through In/out Front/behind On/off **People** Cooperative Mirror/shadow Unison/alternating Competitive Chase/flee Attack/defend

With my interest renewed, I began to explore the Movement Education literature and try to make sense of its key tenets. David Bean's critique of movement education, written over a number of years, was invaluable because it helped with my understanding of the differences between technical and creative movement (Bean, 1983, 1987). His work not only helped me incorporate movement concepts into my teaching but also gave me the vocabulary and understanding to explore many of the

more traditional Movement Education texts (e.g. Morrison, 1969; Williams, 1979; Long, 1982). Furthermore, as I began to consider a fundamental movement and movement concepts approach as a possible alternative to the existing primary PE curriculum (Fife Regional Council, 1980), the developmental PE literature also introduced me to a range of different teaching approaches based on the amounts of control the teacher or child would have in learning contexts (Gallahue, 1987; Mosston & Ashworth, 1986). I began to understand how a mix of exploration, guided discovery and command-style teaching could help teachers and children develop technical competence, adaptability and creativity in PE contexts. For the first time, I engaged with a literature I found inspiring because I understood a clear developmental and inclusive vision, and envisaged what PE might look like in the future.

However, while I consolidated and extended my early years developmental PE knowledge over the next seven years, by 1996 this type of developmental thinking, although acknowledged globally, was incompatible with the traditional sport-related approach which was driving primary PE in England. I found it increasingly difficult to find an audience with which to share my vision, and was essentially cut out of local and national developments in primary PE. For example, I had a series of professional papers for the only primary PE journal in the UK rejected because they did not 'fit in' with national curriculum developments. In discussion with colleagues, I made the decision, at another bifurcation point, to change career direction by seeking to create a more robust and extended rationale for developmental PE.

Revisiting the Developing Child

As I sought to extend my original developmental PE vision my, knowledge building completely moved away from curriculum and pedagogy towards literature supporting a competence motivation case for developmental PE. Subsequently, I spent much of the next four years reviewing literature on the psychological and social factors influencing the children's and young adolescent's engagement in physical activity. As such, my developmental knowledge extended to include the following:

- emotional issues influencing involvement in PE (Fox, 1988, 1989), physical activity (De Bourdeaudhuij, 1998; Sallis, 1995) and sport (Horn & Harris, 1996; Duda, 1997)
- social issues influencing involvement in sport (Brustad, 1996; Weiss, Smith & Theeboom, 1996)
- relationship between actual and perceived competence in the physical domain (Ulrich, 1987; Rudisill, Mahar & Meaney, 1993; Goodway & Rudisill, 1997)
- participation rates in PE (Ross & Gilbert, 1985), sport (Mason, 1995; De Knopp, 1997) and physical activity (Armstrong et al., 1990; Boreham & Riddoch, 2001)
- the assessment of young people's fundamental movement competence (Ulrich, 1985; Walkley, Holland, Treloar & Probyn-Smith, 1993)

During this period, I was also engaged, superficially, with the more complex ecological, dynamical systems and perception-action approaches (Clark & Whitall, 1989; Haywood & Getchell, 1993; Thelen, 1995) that, a decade later, would

influence much of my complex ecological thinking (Jess, Atencio & Thorburn, 2011).

Consequently, throughout the foundation phase, my knowledge building was primarily focussed on two key issues which were directly related to my evolving vision for primary PE. First, I developed a detailed knowledge base around key developmental movement, psychological and social issues influencing children and young people's movement development and physical activity engagement. Connected to this, I also developed an understanding of an integrated early years developmental PE curriculum and pedagogy which primarily focussed on children's acquisition of fundamental movement patterns that were mature, adaptable and creative. Towards the end of the phase, however, my engagement with curriculum and pedagogy literature was sidelined as I concentrated on the psychology of children and young people's physical activity engagement.

Relationships

Although the relationships we develop and sustain across the different levels of the education system are presented as key to the innovation process (Fullan, 1993; Stoll, 2009), attention to the specific nature of these relationships is a relatively new phenomenon (Wenger, 1998; Bielaczyc & Collins, 1999). As such, I have only recently acknowledged how important the different relationships are, and have been, to the on-going development of my curriculum innovation efforts. Looking back, my relationship with the children, students and colleagues has, in fact, always been a critical feature of my capacity, or lack of capacity, to develop and disseminate my curriculum efforts. For example, in my early career as a secondary PE teacher I

usually worked in contexts focussed on content 'coverage' where the teacher-student relationship tended to be controlling and top-down. Tension, as in my own PE experiences as a pupil, was a regular feature of classes. Although I acknowledged the importance of teachers being able to be 'in control' of the teaching situation, I was uneasy with the extent to which teacher control was enacted by some colleagues. However, efforts I made to create more relaxed teaching environments often put me at odds with my first two heads of department and had a particularly negative impact on our working relationships. Relationships with students and staff were more significant than I was prepared to acknowledge at the time.

During the foundation phase, as my developmentally appropriate vision began to percolate into my teaching, I experimented with less controlling and more child-engaging teaching approaches (Gallahue, 1987; Mosston & Ashworth, 1986). After initial hiccups, I became increasingly comfortable making use of a 'teacher-led, student-led' continuum based on different command, guided discovery and exploratory techniques (Pica, 2000; Graham et al., 1980). From then, a recurring theme in my teaching, lecturing and, later, working relationships, has been to design, implement, reflect on and redesign learning or development experiences, involving students and staff working collaboratively to create outcomes within loosely or narrowly defined parameters. While this process has never resulted in rejection of a teacher-lead or command approach, it has had a significant impact on my working relationships, which have increasingly shifted towards being more participative and emergent. During the foundation phase, the more participative pedagogy I engaged in with children and later students, gradually led to more collaborative, as opposed to cooperative (Armour & Duncombe, 2004), relationships with colleagues within,

across and beyond my micro working environments. However, because of the national policy level constraints in England, I had few opportunities to develop more nested relationships at the meso and macro levels.

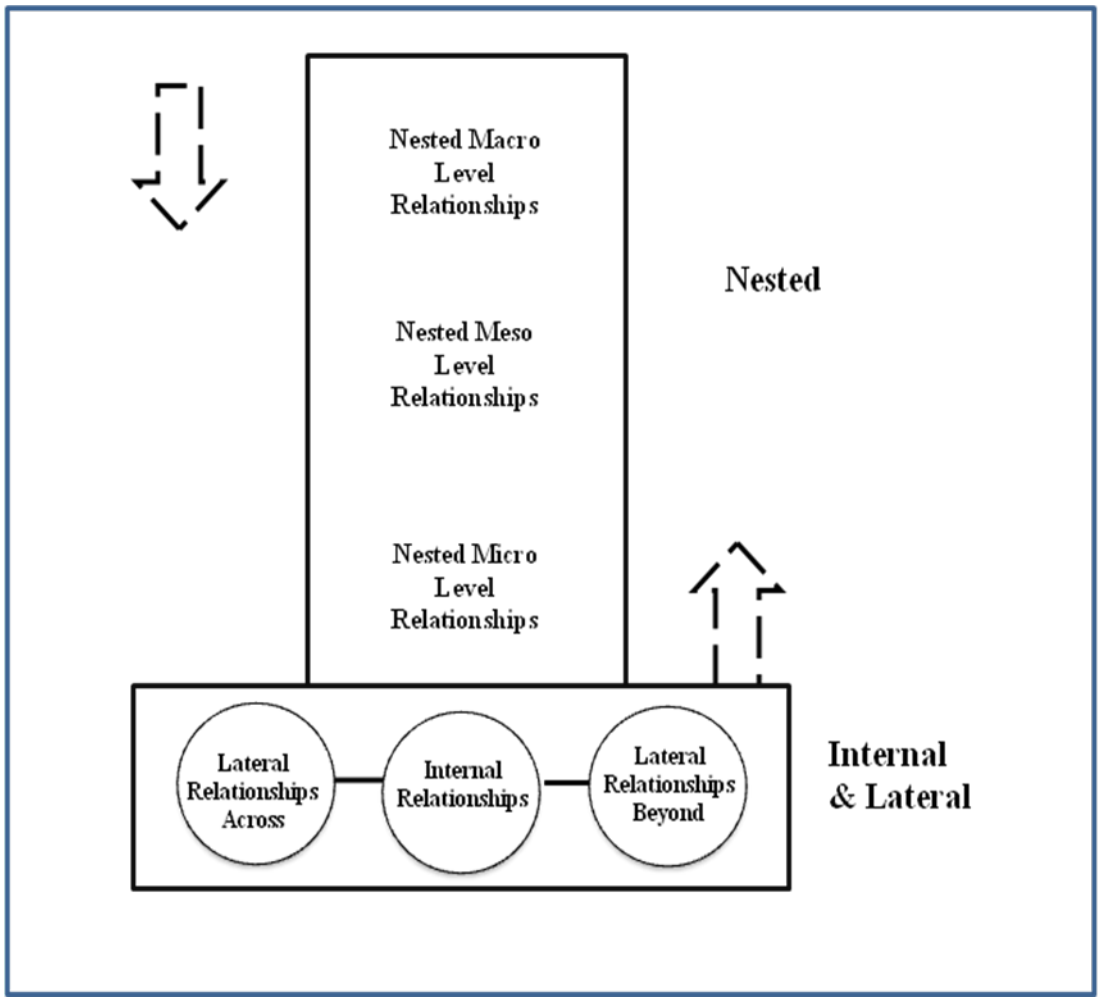

Figure 5.2 Integrating Relationships: Internal, Lateral & Nested

Relationships

From 1989, although my fundamental movement knowledge was a critical component of my new thinking, the notions of adaptability and creativity were to have the greatest impact on the nature of my relationships with children, students and colleagues over time. Initially, while technical movement criteria could be delivered

in a traditional top-down manner, adaptability and, in particular, creativity needed an intentional re-orienting of my relationship with the children I was teaching. While it was to take me many years to clearly articulate adaptability and creativity (Jess, 2004), facilitating children's control of the 'technical, adaptable and creative' was the catalyst that changed the nature of all my working relationships. My first attempts at exploration and guided discovery were uncomfortable, but I gradually found ways to engage the children and give them more control. Consciously, this shift in my pedagogy not only involved more detailed planning, but more appropriate language, open-ended tasks and much more questioning, feedback and reflection. Over time, I became increasingly comfortable setting tasks in games, gymnastics and dance that required individual children or groups of children to develop multiple responses, although constrained within loosely or narrowly defined parameters, i.e. ambiguously bounded tasks. Critically, or perhaps ironically, the marginal status of primary PE offered me the freedom to experiment with tasks that increasingly sought to explore the edge of chaos. I became increasingly encouraged by the children and teachers' responses to the mixture of pedagogical approaches, as I was by Her Majesty's Inspectorate (HMI) when they reported on my work in one school (HMI, 1990). Later, at MMU, having developed the community-based CMC movement classes for young children, I was able to build on my Fife experiences by working with students and parents to co-deliver movement experiences to children between the ages of one and ten. Running for over a decade (long after I left MMU), these classes depended on strong collaborative relationships as they were not compulsory, had parents attending and assisting, and had large sections taught by student teachers. The challenge was to set up contexts in which students could support children in

their movement choices and manipulate the tasks and immediate environment to create developmentally appropriate learning experiences (Gagen & Getchell, 2006). The goal was to set up a context that allowed students to work collaboratively with children at different 'stations' (Graham, 1992) to explore and guide different movement possibilities. From my perspective, although aspects of these classes were teacher-controlled, I was able to witness and support the developing relationships between students and children. As such, my experiences in Fife and at the CMC were particularly important in shifting the nature of my pedagogical relationships with children.

My new pedagogy impacted on the nature of the relationships I developed with university students. As my confidence and knowledge base grew, I experimented with different lecture formats and created seminar sessions to more actively engage students in the learning process. I began to rotate student groupings, set up visits to local schools, have students video each other, create and grade quizzes, produce primary PE advocacy materials, prepare and deliver presentations, discuss how to improve seminar sessions and generally do anything that would help them engage with the task. Influenced by the different teaching approaches from developmental PE, I sought to move beyond a 'filling the empty box' approach and actively engage the students in their own learning. Student responses to this more participative approach, from course evaluations, were generally very positive. However, returning to Scotland in 1999, the immediate context not only replicated the traditional PE 'block' system, but was based on a more formal lecturer-student relationship. Unlike the rest of the university, the PE programme involved more teaching hours (University of Edinburgh, 1999b), which tended to place limited expectation on

student engagement. This was particularly prevalent in the context of students' physical activity subject knowledge, which tended to be transmitted in short 'blocks' of sport, dance or other physical activities. Consequently, engaging students in more participative learning experiences proved problematic. Once again, the limitations of the traditional multi-activity PE curriculum approach impacted on my innovation efforts.

While my pedagogical relationships with children and students were the main focus of the foundation phase, my relationships with colleagues at the different levels of the education system received less attention. However, as the foundation phase moved towards the delivery phase, I became more aware of the importance of relationships with colleagues. Retrospectively, this awareness grew from two key factors: my ongoing frustration at being on the margins because of my interest in primary PE, and the importance of relationships on my two perceived successes, the CMC and my Basic Moves grant.

The marginal positioning of primary PE, and my developmental interest, had a significant influence on the nature of my relationships with all colleagues: those in education, sport science and PE. For example, as I began to develop my ideas in Fife, my relationship with primary school teachers and senior management was mostly pleasant, transient and superficial. With the limited timescales and the top-down delivery model, i.e. I deliver PE, the teachers watch and copy, it remains difficult to work out how these relationships could have developed much further without a systemic change in focus towards a more collaborative agenda. In addition, after my initial '*faux-pas*' with the primary PE specialists and PE advisor in

August 1987, I did not meet this group often enough to create a more collaborative relationship, with the result that I always felt tense with the group and was uncomfortable sharing my ideas about developmental PE. In England at MMU, while the ambitious nature of the department helped me garner support for the development of the CMC, my work remained marginal within the department and the PE team, whose focus was secondary PE. Consequently, my work relationships tended to be quite superficial, although I was able to engage in a small number of collaborative projects during this period (see Maguire & Jess, 1995; Jess & Jones, 1997; Jess & Moore, 1997). In addition, with no primary PE specialists and most primary PE lecturers in England locked into the national curriculum model, I was unable to engage in any degree of lateral capacity building (Fullan, 2004). Finally, during my first two years back in Edinburgh, the traditional secondary PE focus of the department resulted in limited engagement with PE colleagues at the university. Therefore, the overall effect of the primary PE status meant that much of this phase was spent on the periphery of my work contexts, which made it difficult to develop the type of collaborative relationships that would help build the capacity to move my developmental PE agenda forward.

Set within this marginal context, I was fortunate to be involved in two projects which were to offer me an insight into the potential impact of collaborative work relationships. First, the setting up and management of the CMC over a six year period helped me better understand the importance of effective collaborative relationships with colleagues and to seek out the support of key stakeholders (Hargreaves & Dawe, 1990; Fullan, 2004). It was, however, the amount of time this whole process took that surprised me. Setting up the CMC involved many meetings

with colleagues and senior management and highlighted the importance of being able to articulate a vision for the project to individuals with different interests, motivations and knowledge bases. Further, once the project commenced, it was the small group of students and part-time staff who became the key to the running of the CMC activities. Although these activities were all at the local micro level (e.g. community links, marketing, teaching classes and delivering local CPD), it was soon apparent that these new ideas needed a group of committed people to work together to sustain the momentum of the project.

Later, when in Edinburgh, I was involved in a different type of collaborative relationship: a relationship with key, nested, decision-making stakeholders. Between 1999 and 2001, supported by my head of department, I made individual presentations to three national stakeholders in the hope of gaining support. These individuals, the soon-to-be first national physical activity coordinator, the HMI for PE and the Head of Youth Sport at sportscotland, were all to become advocates and allies at the national level. The HMI for PE had attended my presentation at the International Council for Health, PE, Sport and Dance (ICHPER:SD) Conference in 1998 (Jess, Collins & Burwitz, 1998) and had become an advocate of the basic movement agenda (HMIe, 2001). In February 2000, we shared the platform at the first meeting of the Scottish Local Authority Network for PE (SLANoPE) (Jess, 2000) where he signalled his support for my developmental agenda. He suggested, in a formal meeting soon after, that development opportunities may emerge in the future.

The most significant meeting, however, was with the Head of Youth Sport at sportscotland. A former PE teacher, he was also sympathetic to the basic movement case and, although he had no input to the PE curriculum, he could support development projects as long as they fitted within his community remit. Consequently, he suggested we may wish to compile a grant proposal to move the agenda forward. Following a number of further meetings, by early 2001 an agreement was reached on a three year £180,000 grant which would *'provide the basis for the development, delivery and evaluation of a national programme of developmentally appropriate movement programmes that set out to prepare children for a lifelong involvement in different forms of physical activity'* (Jess & Collins, 2000, p. 1). Together, these three national level relationships, something I could not have developed in England, had set up an opportunity to really move the developmental PE agenda forward. Therefore, although the paucity of collaborative working relationships at all the different nested levels of the education system had a significant impact on the scope of my curriculum innovation, the foundation phase not only made me realise the importance of collaborative relationships, but helped me develop a better understanding of the need for collaborative relationships that were both engaging and supportive.

Section Summary

Although my foundation phase experiences were not aimed at capacity building, the previous section has highlighted how my directional and integrating capacities could be used as one way to view the nature of my engagement, or lack of engagement, in the curriculum innovation process. Specifically, it has considered how my on-going efforts to develop and refine a vision for developmental PE were supported by my

emotions, reflection and inquiry skills, and resulted in this vision setting the broad parameters for my knowledge building and relationships during this phase. As will now be discussed, these developing capacities, in conjunction with the contextual factors discussed earlier, were to have an influence on my curriculum innovation efforts during both the foundation and delivery phases.

5.5 Innovation efforts across the Foundation Phase

With the distressing initial conditions between 1987 and 1989, and the incompatibility with the national context in England during the 1990s, the foundation phase was more about creating the early years curriculum innovation, and building capacity to influence the innovation process. It had little to do with widespread educational change. As will be discussed, while I made considerable progress in terms of creating an early years developmental PE curriculum innovation, the dissemination of this innovation effort was relatively limited, as its incompatibility with national policy reduced its attraction beyond the immediate environment.

Curriculum and Pedagogy Efforts

Between 1989 and 1999 in my PE classes in Fife and at the community-based CMC at MMU, I experimented with a range of different early years movement curriculum and pedagogy ideas. As will be discussed later, these initial curriculum innovation efforts were the foundation for the Basic Moves programme that was developed in the delivery phase. In Fife, from 1989, I used many classes as movement 'laboratories' in which I observed children's movement performance. I not only analysed fundamental movement performance in de-contextualised settings, but set up different games, gymnastics and dance situations to observe psychomotor,

cognitive, social and emotional responses in applied settings. As such, I developed a much better understanding of the children's movement abilities and became increasingly aware that whilst the larger body size, greater strength and power of older children meant they would quantitatively outperform the younger children in terms of speed or distance (Gallahue, 1987), there was often little difference in the quality of the movement performance. In many cases, particularly for the less able children, not only was the qualitative difference between the younger and older children limited but, because the older children were more socially and emotionally aware (Haywood, 1986), their movement responses were often more constrained than their younger counterparts (Espenschade & Eckert, 1980). In retrospect, I wish I had made efforts to collect and retain this cross-sectional data for future use. It was, however, a significant period of personal learning as I developed a much better understanding of the children from both a holistic and a movement perspective.

As my understanding of children's fundamental movements increased, my 'laboratory' experiences moved beyond the observation of movement competence and over the next two years I developed my pedagogy using different movement criteria, movement concepts and teaching styles. This introduced me to a new type of PE experience which focussed on children's learning and not simply on the delivery of specific physical activities. This experience quickly transformed my approach to teaching as I now felt less constrained by a need to 'cover' specific activity content and more compelled to identify children's strengths and weaknesses in order to concentrate on appropriate learning experiences. The more controlling approach I had employed as a secondary PE teacher now had significant limitations, particularly when the intention was for the children to explore their own and others

ideas. As noted earlier, my first attempts at exploration and guided discovery were extremely uncomfortable. I muddled my way through open-ended tasks with six year olds which led to limited or non-existent exploration. I also tried guided discovery questions with ten year olds that were met with silence, inactivity and not even a wrong answer. As a result, I soon realised exploration and guided discovery needed more initial planning and preparation than my more controlling teaching style and began to find more appropriate language, tasks, questioning and feedback to productively engage the children. Although my focus remained on the technical aspects of the movement patterns, I was increasingly able to incorporate movement concepts into my teaching to help the children explore movement space and to adapt to different contexts. I used many of the movement education texts which had long frustrated me, particularly William's (1979) and Long's (1982) texts on educational gymnastics. As I became more confident I began to include movement concepts, exploration and guided discovery across the range of PE activity contexts which included gymnastics (particularly balance), dance (including Scottish Country Dance) and, latterly, games, after I had attended a course on 'Teaching Games for Understanding' (Bunker & Thorpe, 1982). In addition, I introduced health-related physical activity sessions which were based on many of the ideas from my psychology course, particularly task-oriented behaviour, goal setting and choice. Ultimately, I shifted between more child-centred and teacher-centred approaches when I thought appropriate and explored more edge of chaos possibilities with the children. I explored different ways to deliver learning experiences, shifting from a 'friendly' command style to employ a mix of exploration, guided discovery and command (Gallahue, 1987; Mosston & Ashworth, 1986). Giving more control to the

children in terms of them choosing different tasks, creating different activities and collectively solving tasks or questions set by me was a liberating experience for both myself and the children. With the children more involved in their own learning, the class teachers with whom I was working increasingly reported that the children were practising PE movements or routines in the month between my visits. I felt I was building a more appropriate knowledge and experiential base to help me create developmentally appropriate PE programmes for early years children.

However, in England, with primary schools locked into the multi-activity PE curriculum approach, I originally conceived of the CMC as a small-scale community-based exercise to integrate the developmental courses as part of an evolving developmental primary PE curriculum project. Working with local children, the Centre would give students the opportunity to teach a developmental movement programme, offer me the opportunity to explore the possibilities of the developmental curriculum and hopefully create a context for my PhD studies. Consequently, for the five years between 1994 and 1999, these movement clubs offered me the opportunity to revisit the developmental movement ideas I had started to explore in Fife, and to consolidate and extend my range of curriculum and pedagogy ideas. Subsequently, although my teaching of developmental movement stopped in 1999, these rich experiences in schools and community settings, linked to my on-going inquiry and reflection, created a solid knowledge base and participative pedagogy approach that acted as platform for the Basic Moves programme that would begin in September 2001.

Professional Learning

Professional learning opportunities to disseminate my curriculum innovation ideas beyond the immediate context during the foundation phase were very limited. While I was offered the opportunity to deliver short CPD courses to primary schools while at MMU, these courses were all one-off and infrequent. The marginal nature of primary PE, the emergence of the YST's TOPS programme and the incompatibility of my developmental PE ideas with the national curriculum collectively resulted in few professional learning dissemination avenues during this phase. On my return to Scotland, things were little better when the university had to cancel a national primary PE conference because of lack of interest by teachers. Consequently, by September 2001, when Basic Moves and the delivery phase were about to start, while I had been invited to deliver a number of presentations about my developmental rationale, I had only delivered one short CPD course in Scotland. As such, my engagement with innovative professional learning for teachers during the foundation phase had been limited.

My innovation efforts during the foundation phase were generally limited and mostly focussed on 'in-house' curriculum and pedagogy attempts to develop a developmental movement programme for young children.

5.6 Chapter Conclusion

This Chapter has focussed on the foundation phase of my personal developmental PE project from 1987 to 2001 and set out to explore how the capacities and contextual factors of the CEA influenced my curriculum innovation efforts. The chapter has demonstrated that while, I had little capacity in 1987, the different contexts in which

I worked impacted on my curriculum innovation efforts and the phase was primarily characterised as a self-organising, capacity building phase. While the broad and narrow parameters of the different contexts impacted on my curriculum innovation efforts, it was the macro policy context in 1990s England that did most to constrain these efforts and wedge them into the immediate micro context at MMU. However, within each of the different contexts across the phase, my task-oriented focus, developed in the late 1980s, helped me engage in an on-going inquiry and reflective process that developed a clear vision and built a detailed knowledge base to inform my developmental PE innovation efforts. Unfortunately, while I re-oriented my pedagogical relationships with children and students during the phase, because my developmental PE approach was at odds with the dominant approach to PE in English primary schools, the positive collaborative relationships needed to move the developmental PE project forward were lacking. Consequently, at the end of the foundation phase, although I had developed some of the key personal capacities needed to consolidate and extend my on-going curriculum innovation efforts, I had been unable to create the appropriate collaborative connections. Therefore, with the funding for Basic Moves in place, it was increasingly apparent that, as I was about enter the delivery phase of the DPEP in September 2001, collaborative relationships were likely to be a significant variable in my future curriculum innovation attempts.

Chapter 6: The DPEP: Delivery Phase

6.1 Introduction and Initial Conditions

Building on the foundation phase, the DPEP delivery phase commenced in September 2001 when two members of staff started two-year contracts as a result of the grant awarded to develop the Basic Moves programme. The Developmental PE Group (DPEG) was formed. While capacity building continues to be a key feature of the DPEG's work, the focus of the delivery phase has been, and continues to be, a more expansive and more collaborative project concentrating on the design, dissemination and evaluation of a larger scale 3-14[12] PE curriculum innovation. As such, the delivery phase covers two interconnected projects: the Basic Moves Project from 2001 until 2007 and the 3-14 Project from 2006 until the present day (see Table 6.1).

Table 6.1 The Innovation Contexts of the DPEP Delivery Phase from 2001

Project	Phase Period	Setting	Role Characteristics	Sub Phase Focus
Basic Moves	2001-2007	Scotland	Senior Lecturer and Project Manager Part time PhD student until 2004	Basic Moves programme development, dissemination and evaluation
3-14	2006 ongoing	Scotland	Senior Lecturer and Project manager Part time PhD student from 2007	3-14 PE programme development, dissemination and evaluation

These extended curriculum innovation efforts of DPEG have taken place in Scotland as I have continued in my role as senior lecturer in PE at the University of

[12] Following the initial Basic Moves programme, for children aged 5-7 years, my curriculum efforts extended to cover the age group from 3-14 years i.e. the preschool, primary and early secondary school years. As such, throughout the text, these extended curriculum efforts will be termed 3-14.

Edinburgh. However, by 2011, the DPEG is now a larger group which includes four seconded teaching fellows, a part time researcher, two final year PhD students, a full time administrator, numerous part time academic and professional staff and funding to support the group until at least August 2012. Subsequently, with the DPEG's mission now to develop, deliver and evaluate a developmental PE programme for children and young people aged 3-14 years, the group engages in a wide range of integrated professional and academic innovation activities revolving around curriculum innovation, pedagogy and professional learning.

6.2 Initial Conditions in 2001

As I entered this delivery phase in 2001, initial conditions were very different to those of 1987 when the DPEP first started. At the policy level the Scottish Executive had tried to create a policy-making context to connect with its social capital principles (Curtice, McCrone, Park & Paterson, 2002), set education priorities emphasising equality and inclusion (Humes, 2003), and endorsed sweeping reforms to support teachers' professional standing (Scottish Parliament, 2001). However, PE, and primary PE in particular, remained on the margins with little evidence of any likely change in the short or medium term (HMIe, 2001). At the meso and micro levels, while the university's focus remained on high level academic study, staff in the PE department continued to demonstrate little interest in activities beyond the undergraduate B.Ed. in secondary PE. As such, my personal working conditions had not changed in the two years I had spent in Edinburgh and I continued to be marginalised by the core PE lecturing group: the 'indigenous experts' whose sole focus was the B.Ed. in secondary PE. However, the funding for Basic Moves opened

many potential innovation opportunities, particularly through one of the new Basic Moves staff, a seconded primary PE specialist, who was able to attract PE colleagues to the project. Not only would my lecturing commitments now be shared, but I would be able to focus, collaboratively, on the Basic Moves project with colleagues whose teaching experiences had been concentrated on primary PE for many years; something that had not been possible for me in England. I had my first opportunity to work with a colleague whose substantive role was to support the development and evaluation of an early years developmental PE curriculum. This new collaborative starting point for my developmental PE agenda, in the guise of Basic Moves, was a major step forward which, in the long term, would send my DPEP on a much more collaborative and ultimately expansive trajectory.

At a more personal level, I entered the Basic Moves Project in a much better position than I had at the start of the DPEP in 1987. Emotionally, I was in a more positive frame of mind and felt I had built some capacity to re-engage with the applied implications of the developmental PE agenda. My earlier investigation of the North American motor development and developmental PE literature had helped me construct a detailed knowledge base around early years child development, curriculum and pedagogy. My experiences teaching in Fife and managing the CMC at MMU had developed an experiential base in early years pedagogy, small scale entrepreneurial activity and project management. Finally, my academic study in the late 1990's had further helped me develop a much clearer vision of Basic Moves based on extended developmental and competence motivation principles (Jess, Collins & Burwitz, 1998). However, with the period from 1997 until 2001 mostly focussed on scientifically-oriented research activities for my first PhD attempt, I

entered the Basic Moves project with little recent curriculum and pedagogy engagement and no knowledge of the innovation-making and innovation-dissemination processes that would now be an essential part of the project (Rogers, 1995). Further, although I had the support of some nested stakeholders, I had few internal or lateral relationships to assist with the development and dissemination of Basic Moves. I was conscious that if the project was to have any chance of success it was essential I began to build positive working relationships with key stakeholders who could assist in both the development and the dissemination of Basic Moves (Havelock & Zlotolov, 1995). Therefore, the starting point for Basic Moves in 2001 was tentative. While I personally felt I had developed the appropriate knowledge and experiential base to lead the project, the national context was not particularly positive for primary PE, and we (the DPEG) still had to find out if Basic Moves was an innovation that teachers and physical activity professionals would be prepared to support.

However, a sequence of national and local developments over the next few years created a rich macro level context to support our innovation efforts and helped create the local conditions for a group of like-minded primary PE teachers to work together. Subsequently, from this small collaborative beginning in 2001, the DPEG entered a decade of curricular, pedagogical and professional learning activity on the basis of a growing alignment with national policy, a constantly evolving vision of developmental PE, and a significant degree of collaborative and nested activity. This chapter aims to build on the previous chapter (Chapter 5) by exploring the potential of the CEA during the delivery phase. Three related issues will be discussed, (refer to Figure 1.1).

1. The Context across the Delivery Phase
2. Developing Capacities across the Delivery Phase
3. Innovation Efforts across the Delivery Phase

The chapter will conclude by describing the DPEG's different innovation efforts in primary PE curriculum, pedagogy and professional learning across the delivery phase. Again, it is important to reiterate that, until 2007, these curriculum innovation efforts were not informed by the CEA and, as such, most of my account will be a retrospective analysis of those key contextual factors and developing capacities that provided the most insight into the nature of my DPEP efforts. However, complex ecological features have directly influenced the DPEG's innovation efforts since 2007 and, accordingly, the text will refer to these features when appropriate.

6.3 The Context across the Delivery Phase

As in the previous chapter, this section focuses on the key macro, meso and micro factors framing the evolving context during the delivery phase.

The Macro Context: Policy and Education

Given the initial post-devolution policy intentions of the Scottish parliament, education in Scotland witnessed significant change during the first decade of the 21st century; change that has presented the opportunity to introduce more contemporary practices in all areas of education. With the Scottish Executive setting out to make the policy making process more inclusive and participative (Arnott, 2009), a national education debate was held involving over 20,000 people (Munn, Stead, MacLeod et

al., 2004) and paved the way for a return to a more consensual and open style of policy development (Ozga, 2005). This debate did not lead to major structural changes in the education system, but it did result in more government interest in innovative curriculum approaches. In particular, most interest was directed to approaches inspired by social justice principles and lifelong learning agendas concentrating on 'health and wellbeing' as well as economic development (Scottish Executive, 2003b). While lifelong learning remains a contested domain (Hargreaves, 2005), particularly in terms of the intended audience (Penney & Jess, 2004), the Scottish Executive was quite clear in its orientation by stating that;

Lifelong learning policy in Scotland is about personal fulfilment and enterprise; employability and adaptability; active citizenship and social inclusion…Lifelong learning encompasses the whole range of learning: formal and informal learning, workplace learning, and the skills, knowledge, attitudes and behaviours that people acquire in day-to-day experiences.

(Scottish Executive, 2003b, p. 7)

This inclusive and lifelong focus signposted an orientation towards delivering 'what learners want and need' (Scottish Executive, 2003b), and, as such, highlighted that those providing learning should '*work out new ways to design, deliver and evaluate learning which meets learners' needs*' (p. 54). From a school curriculum perspective, this resulted in a more learner-centred approach and government policy heralded a move away from a 'traditional' subject-based secondary school curriculum with its associated narrow pedagogy (Bryce & Humes, 1999). An all-through 3-18 'Curriculum for Excellence' (CfE), framed around learning goals which

concentrate on young people becoming ‘successful learners’, ‘confident individuals’, ‘effective contributors’ and ‘responsible citizens’, was subsequently introduced (Scottish Executive, 2004a). Since then new policy guidance (Scottish Government, 2009), has resulted in attention being focused on articulating how these four capacities can be developed through learning across the curriculum areas.

Furthermore, in three particular areas (literacy, numeracy, and health & well-being) the interdisciplinary nature of learning has become a policy aspiration so that every teacher has a responsibility in these areas (Scottish Government, 2009). Policy, subsequently, is increasingly encouraging teachers to actively engage with curriculum flexibility and breadth and to employ more active learning approaches to become ‘*the creative, adaptable professional who can enjoy developing the ideas that arise when children are immersed in their learning*’ (Scottish Executive, 2004c, p. 19). However, consistent with the education profession in England, many Scottish teachers are no more satisfied with the manner that educational reform has taken, complaining of innovation overload, restructuring of promotion opportunities and consistent accountability measures (Arnott & Menter, 2007).

Nevertheless, Scottish education has held close to its cultural traditions in terms of social justice, inclusion and participation, whilst still retaining its interest in performance agendas (Donaldson, 2010). A new policy context has been created in which, unlike the 1990s, innovative practice within broad boundaries is being both encouraged and, as will be discussed later in this chapter, supported.

Primary PE during the Delivery Phase

Between 2001 and 2004, physical activity and PE emerged as topics of policy interest for the Scottish Executive (Scottish Executive, 1998), and, since then, both have received unprecedented political attention. One significant outcome from this increased interest has been the emergence of primary PE from its long marginalised role to a considerably more central position within Scottish education (Jess & Dewar, 2008). With data from the Scottish Health Survey (Scottish Executive, 1998), revealing high levels of inactivity and obesity in the population at large, a physical activity task force was set up in 2001 and soon became the catalyst for many future developments (Scottish Executive, 2003a). Critically, the task force recognised the specialist nature of PE and the need for high quality teaching, learning and curriculum frameworks as the basis for tackling problems with inactivity and lack of interest among children and young people. A minimum two hour per week PE curriculum entitlement for all children was recommended, as was a national review of PE to '*tackle the status and content of the PE curriculum and the resources for its delivery*' (Scottish Executive, 2004b, p. 43). In addition, the task force commended Basic Moves as a programme that 'will help children develop their basic movement skills so they will be able to take part in physical activity throughout their lives' (p. 44). For the first time, my developmental PE agenda was overtly being supported at the national level. A PE Review Group (PERG), of which I was a member, was subsequently created and in June 2004 reported with a vision of PE in line with contemporary social justice and lifelong learning agendas (Scottish Executive, 2004a). This review heralded a move for PE from the margins of education to a more central position when the Scottish Executive highlighted the subject as '*an*

aspect of the curriculum which, exceptionally, needs greater priority to support the health and well-being of young people' (Scottish Executive, 2004c). In addition, a series of the recommendations set the context for a major change in the direction and fortunes of primary PE and included:

- A move to at least two hours of curriculum PE for all children and an additional 400 teachers

- A conclusion that the greatest impact would 'be gained through improvements in the curriculum' (p. 27)

- Early education in pre-school and primary school 'should focus on the development and enhancement of skills, as well as exploration of the connection between physical activity, health and wellbeing.' (p. 27) and that 'without basic movement skills, pupils will be excluded from participation in many activities, or may find their enjoyment compromised. Therefore, the development of skills is fundamental to continuing involvement and full participation in PE.' (p. 27)

- Finally, the long standing problems of primary PE delivery (HMIe, 2001) were acknowledged by recommending that 'every primary school in each primary cluster should have adequate access to support from a PE specialist' (p. 30) alongside the need for continuous staff development in primary schools as 'the levels of confidence, skills and knowledge of class teachers vary considerably' (p. 30)

The review clearly signalled primary PE as a curriculum area requiring considerable support in the coming years. Subsequently, since 2004, the impact of the PE review

group report has been both gradual and sustained leading to a number of key developments which currently set the platform for a re-orientation of PE and offer significant opportunity for change and development. A National PE Officer presently works closely with HMIe, other government bodies and local authorities to help the process of implementing the review group recommendations. From a curriculum perspective, as noted earlier, after many years subsumed within the expressive arts subject area (SOED, 1992), PE has been re-housed within the new core area of health and well-being, although the integrated learning focus of the new Scottish curriculum has seen dance retained within the expressive arts (Scottish Government, 2009). New learning outcomes (Scottish Government, 2009) presented a wider vision of PE with closer links to health and lifelong learning agendas while retaining clear connections to sport agendas. Most recent figures regarding the two hour curriculum target have seen a remarkable increase in primary schools from a baseline figure of 5% of classes in 2004 to 2005 (Scottish Executive, 2006) to 55% in 2009 to 2010, while secondary Figures have only increased from 7% to 23% (Scottish Government, 2010).

Opportunities for primary teachers to undertake primary PE-CPD have emerged. Most notably, as will be discussed later, the Scottish Executive Education Department (SEED) in 2006 commissioned the Universities of Glasgow and Edinburgh to develop and deliver postgraduate masters-level certificates in primary PE. These programmes were set up to enable existing classroom teachers develop a specialism in primary PE, and the uptake to the programmes has far exceeded the initial 400 teacher places allotted to the project. By March 2012 these Figures will rise to almost 1,300 teachers and, as a consequence, the imbalance in Scottish PE,

which saw 95% of specialist PE teachers being employed in secondary schools (Scottish Executive, 2006), will have started to be addressed.

Finally, an increasing number of initiatives are being introduced to support the developments taking place in curriculum PE. The Active Schools Programme, discussed in the previous chapter, is now an established feature of the education landscape and offers children opportunities to be physically active before, during and after school, as well as in the wider community. With over 300 full time active primary school coordinators, over 300 part time secondary school coordinators and 32 active schools mangers, the programme has made a significant impact on physical activity levels, particularly in primary school settings (sportscotland, 2006). In addition, outdoor learning has received increased attention within the context of the Curriculum for Excellence and offers PE a further opportunity to draw close links with other curriculum areas (Beames & Atencio, 2008). As such, progress in curriculum PE is being mirrored in physical activity and sport across school and community contexts with the result that opportunities to engage in integrated, multi-sector developments, to further enhance the role of PE as a core part of children's lives and education, are now increasingly on offer.

Seven years after the publication of the PE review group report, PE, and primary PE in particular, has started to move to a more central position in the education and physical activity communities. With more curricular time, more extra-curricular and community opportunity for children, there is now more opportunity for teachers to undertake more in-depth professional learning. For a subject area long marginalised (Green, 2000), PE in Scotland is being offered the opportunity to re-conceptualise itself as a subject which is sensitive to contemporary educational thinking, a move

which resonates with the global calls to update both the content and the delivery of the PE curriculum (e.g. Penney & Chandler, 2000; Light, 2008; Bailey, Armour, Kirk, Jess, Pickup, & Sandford, 2009). Much still needs to be done, but the platform for future development is beginning to take shape. At a personal level, these macro level developments have not only moved PE forward but have set up innovation opportunities that were unthinkable at the beginning of the delivery phase of the DPEP.

The Meso and Micro Contexts

Within this more participative and positive policy context, developments at the meso and micro levels have also moved forward. At the meso level, the aspirations of the University of Edinburgh have developed towards a worldwide agenda. Whereas in 1999 the university aimed to be *'a leading European centre of academic excellence' (*University of Edinburgh, 1999a) by 2010 these aspirations are now focussed on 'world-leading' academic excellence in both research and teaching (University of Edinburgh, 2010). This move to seek world-status is bearing fruit as the university is regularly ranked in the top 25 universities worldwide (e.g. Guardian, 2010).

At the micro PE departmental level at the university, the decade from 2001 has seen a gradual but steady cultural change in the academic aspirations of the PE staff members, particularly following the recent restructuring and refocusing of the School of Education. While no PE staff were involved in PhD study in 1999, most of the PE staff lecturers are now engaged in postgraduate study and it is likely almost all full-time PE staff will have completed PhDs by 2012. Although the undergraduate secondary PE degree remains the dominant focus, a more expansive PE agenda in research, postgraduate study, teacher education and academic publications have all

emerged. As a consequence, although the future of teacher education in Scotland is currently unclear (Donaldson, 2010), the PE staff are in a position to make a significant contribution to the 'world-leading' aspirations of the university. As the PE group begin to view PE from this broader and more integrated perspective, my personal efforts, and those of the DPEG, are now less marginal and able to make a more constructive contribution to the future direction of the PE area.

Section Summary

The first decade of the 21st century has seen PE in Scotland move from its long term marginal role in education to take up a more central and visible position within health and well being. As such, the ambiguously bounded nature of my innovation efforts has been more obvious, particularly as the change in status of primary PE has been more noticeable with the introduction of the postgraduate certificates in primary PE and the Active Schools programme (Jess, Carse, McMillan & Atencio, in press). Further, and in line with these macro level changes, the PE group at the University of Edinburgh has gradually focussed on a broader professional and academic agenda to not only connect with developments across Scotland, but to PE agendas around the world.

6.4 Developing Capacities across the Delivery Phase

Set within this contemporary context in Scotland, this next section explores how my personal capacities, and those of the DPEG, have helped us cope with and influence curriculum innovation during this delivery phase. This section, as in the previous chapter, concentrates on those directional and integrating capacities that have helped focus, guide and integrate the DPEG's innovation efforts (see Figure 6.2).

Specifically, consideration is given to the ongoing influence of emotional, reflective and inquiry skills and the impact of the developing vision, knowledge and relationships. However, while exploration of the Basic Moves project from 2001 until 2007 remains a retrospective exercise, the 3-14 project from 2007 has been developed concurrently with the CEA and, consequently, recent innovation efforts have been more closely aligned with the CEA principles and capacities discussed earlier (refer to Figure 3.7 on page 79):

Directional capacities

Emotions, Inquiry and Reflection

During the DPEP delivery phase emotional, inquiry and reflection skills have all been central to the ongoing development and extension of our curriculum innovation efforts. From an emotional perspective, because the Basic Moves and 3-14 Projects have been more collaborative ventures they have involved many intense meetings addressing a range of curricular, pedagogical and professional learning topics. These discussions, particularly in the early days of the DPEG, were particularly stressful as DPEG group members and other PE colleagues were challenged, after years as isolated primary PE specialists, to reconsider their traditional PE content and behaviourist pedagogy, i.e. their 'indigenous knowledge'. Although these meetings were tense and pushed the group to the edge of chaos on many occasions, they were critical in sustaining the shared vision that unites the group in this collective enterprise.

From a personal perspective, after many years working in an isolated manner, being able to discuss and share my ideas with like-minded colleagues, even although this

was time consuming and tense, has probably been the most rewarding experience during this delivery phase. However, as the DPEG's work has expanded I found myself involved in meetings at more nested national levels. While these meetings have become a necessary part of the DPEP dissemination process, and have helped create important relationships with key national stakeholders, many of the one-off or short-term projects have been stressful because of the superficial nature of the interaction with the individuals involved. In particular, the orientation of some meetings has been highly ego-oriented with key individuals only presenting one point of view and not interested in acknowledging others. This was particularly the case during the PE review group between 2002 and 2004 when individual group members would consistently focus on one specific issue, e.g. the status of PE as a practical subject area or after school sport. As a consequence, while it has been important to acknowledge the importance of engaging in the nested PE context, these meetings have also been stressful and uncomfortable. In addition to the emotional side of the DPEG innovation efforts, and as will become apparent throughout this section, inquiry and reflection skills have remained key collective drivers of the vision, knowledge and relationship building that have proved essential features of the DPEG's extended innovation agenda. As such, emotional, inquiry and reflection skills continue to be key process capacities directing the DPEG innovation efforts.

The Evolving Vision

At the beginning of the delivery phase, the developmental PE vision based on developmental appropriateness and competence motivation had helped consolidate my view of developmental PE and, in particular, had helped clearly articulate a 'Case for Basic Moves' (Jess & Collins, 2003). While this core vision continues to

support the developmental PE agenda (Jess et al., in press), as the delivery phase progressed and the innovation efforts extended, the narrow focus on a small number of key variables (i.e. movement competence, perceived competence and significant others) began to limit the curricular and pedagogical possibilities. It became clear that further attempts to extend our curriculum innovation efforts would require a wider theoretical perspective. Subsequently, over the next decade I, and now we, have sought, somewhat chaotically, to extend this initial theoretical stance by engaging with three more extensive perspectives: an ecologically-oriented approach (Welk, 1999), a lifelong perspective (Penney & Jess, 2004), and, most recently, the complex ecological approach discussed in Chapter Three (Jess et al., 2011).

The initial attraction of Welk's 'Youth Physical Activity Promotion Model' (Welk, 1999), was that it highlighted the complexity of lifelong physical activity (LLPA) by identifying the many factors influencing an involvement in physical activity over the lifespan (Sallis, 1995). Further, Welk's model noted the interrelated nature of this lifelong process and acknowledged there were key factors that could be modified to encourage physical activity participation (see Figure 6.1). Most significantly, and extending my competence motivation vision, Welk identified a wider range of modifiable factors that are developmental in nature and, consequently, could be influenced by PE and physical activity programmes. While Welk's model presented a broader vision of the foundation for LLPA, his approach also supported my initial developmental PE vision (Jess & Collins, 2003).

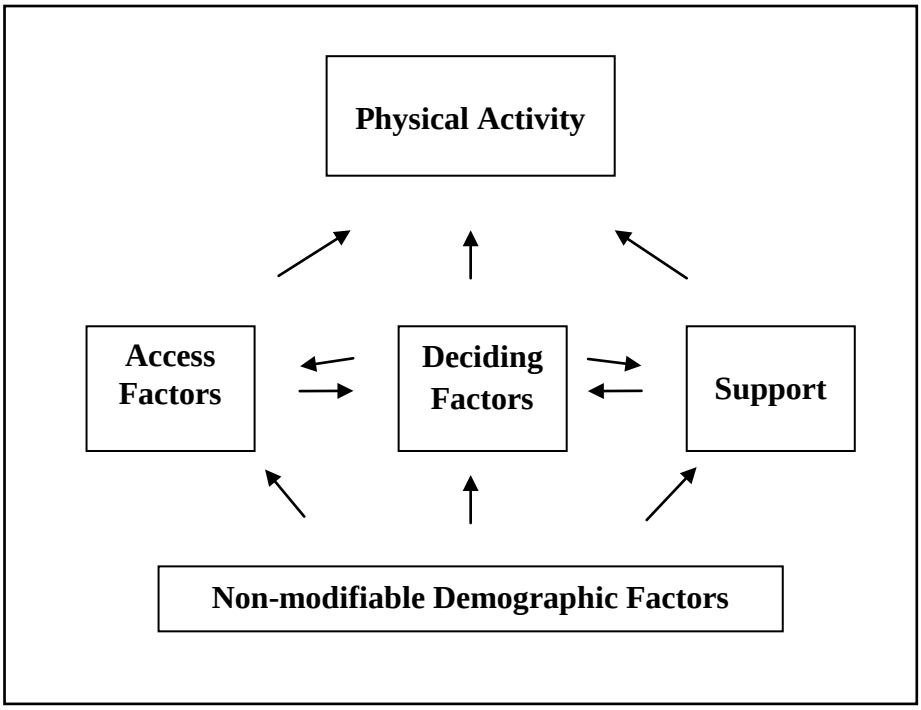

Figure 6.1 The Youth Physical Activity Promotion Model (adapted from Welk, 1999)

Building on this extended LLPA vision, and working with Dawn Penney, I developed a multi-dimensional conceptualisation of LLPA (see Table 6.2) which built upon the initial DPEG principles and was additionally informed by contemporary thinking in lifelong learning (Penney & Jess, 2004; Jess, 2004; Penney, Jess & Thorburn, 2006).

Table 6.2 The Dimensions of Lifelong Physical Activity (LLPA) (from Penney & Jess, 2004)

- **Functional Physical Activity** (FPA)

  In response to demands of everyday living, i.e. work and home life;

- **Recreational Physical Activity** (RPA)

  Physical leisure pursuits, which, for many, are socially-orientated;

- **Health-related Physical Activity** (HRPA)

  Concerned with fitness, well-being and/or rehabilitation;

- **Performance-related Physical Activity** (PRPA)

  Concerned with self-improvement and/or success in performance environments

- **Support Physical Activity** (SPA)

  The role we play to support others' pursuit of LLPA.

Central to this conceptualization were three key beliefs about LLPA. First, PE should engage with the issues of lifelong learning alongside those of lifelong physical activity. Secondly, the successful fulfilment of a lifelong learning agenda must link closely with curriculum experiences across the 3-18 age range, as these are the only experiences every child is guaranteed to engage with, in order to help them develop a solid foundation for lifelong physical activity involvement. Finally, learning is both a lifelong and a lifewide endeavour (West, 2004), that results in many extra-curricular and community contexts in which learning takes place, and in which many individuals are involved in the learning process. Therefore, while

focussing mostly on curriculum PE as the basis for LLPA, the DPEG began to actively engage in the complex task of creating cross-sector learning communities in which all stakeholders play a role in the development of these foundations.

However, while this engagement with an LLPA vision further strengthened the case for developmental PE and Basic Moves, in more applied terms, it did not help with the re-structuring of the 3-14 PE curriculum or the associated professional learning activities in which we were now heavily engaged. By 2006, I was concerned. While the theoretical approach underpinning the DPEG's curriculum innovation efforts offered a plausible alternative view to the traditional PE approach, it did not help with the task of extending the curriculum beyond the five to seven age range. It also did little to influence the professional learning processes that were becoming increasingly more complex as the DPEG's Basic Moves efforts extended to a much wider audience. Subsequently, as has been discussed earlier in the thesis, I started to investigate a range of contemporary theories, including social constructivism, ecology, dynamical systems and complexity theory, in an effort to more effectively frame our curriculum, pedagogy and professional learning innovation efforts. From this, a complex ecological vision has gradually emerged to not only build on my existing developmental thinking but, as will be discussed throughout the rest of this chapter, impact upon my knowledge base and the DPEG's more recent curriculum, pedagogy and professional learning innovation efforts.

Integrating capacities

With primary PE emerging as a more prominent feature of the national education scene in Scotland, the DPEG's innovation activities during the delivery phase not only became more compatible with national policy, but more visible across the PE and education communities. The knowledge base informing the DPEG's innovation activities and the relationships helping with the dissemination process, particularly professional learning relationships, was very different from those during the foundation phase. This section considers the nature of the evolving knowledge base and the new relationships during this phase.

Knowledge

With the period from 2001-2006 focussed on Basic Moves, a re-creation of the movement programmes from the CMC at MMU, the knowledge base informing the innovation process was similar to that of the mid 1990s. As discussed above, when the DPEG began to engage with the professional learning activities to disseminate Basic Moves and extend the developmental programme beyond the five to seven age range, both the vision and related knowledge base were unable to support these tasks. Consequently, many of the innovation efforts from 2004 until 2007 lacked the focus and consistency that had been apparent in the early Basic Moves work. However, as the group began to engage with more complexity-oriented notions of innovation, a new knowledge base began to emerge that has not only accommodated a more open-ended view of Basic Moves but has helped inform the more complex innovation efforts that were to follow. From 2006 onwards the theoretical re-orienting of the DPEP has been a more collaborative venture with colleagues, post-doctoral

researchers and PhD students making valuable contributions to the DPEG's complexity-informed curriculum, pedagogy and professional learning innovation efforts (e.g. Jess et al., 2011; Atencio et al, in press; Jess et al., in press; Thorburn et al., in press).

A Complex View of Curriculum and Pedagogy

Building on the initial issue of complexity and behaviourist (modernist) viewpoints, we were able to present different ideas on how to approach curricular, pedagogical and professional learning. With its foundation in self-organising emergence and uncertainty, and building on the work of Morrison (2003), we envisaged how a complex curriculum differs from the predictable certainty of a behaviourist curriculum (see Table 6.3).

Table 6.3 Characteristics of complex and modernist/behaviourist curricula (adapted from Morrison, 2003)

Key Features of a Complex Curriculum	Key Features of a Modernist/Behaviourist Curriculum
• Emergent responses • Uncertain outcomes • Self-organising • Process-driven • Non-linear • Organic • Diverse • On-Going • Edge of chaos • Adaptable • Creative • Flexible	• Predictable responses • Certain outcomes • Externally controlled • Product-driven • Linear • Mechanistic • Standardised • Time constrained • Stable • Pre-determined • Fixed • Inflexible

In Jess, Atencio & Thorburn (2008; 2011), we have highlighted how the content, practices and behaviours which illustrate these two perspectives are quite different. For instance, because a complexity perspective sets up the conditions whereby learning outcomes are considered uncertain, curriculum content itself must be flexible to facilitate behaviours and practices that are non-linear and on-going. In contrast, behaviourist notions of certainty lead to fixed curricular content resulting in the standardising of children's and teachers' behaviours and practices. This behaviourist curriculum is thus concerned with predetermined outcomes, as well as the mechanistic delivery of material to pupils who are considered to be on linear learning trajectories.

The uncertainty and diversity of complex systems underpin curriculum practices which provide for learners as self-organisers who are able to exhibit emergent behaviours that are adaptive and even creative. This non-linear and organic curriculum leads to self-organising learning trajectories that are ambiguously bounded by a range of constraints (e.g. national guidance), and have the potential to regularly approach the edge of chaos. As noted earlier, learners as complex systems are not governed by an 'anything goes' mentality but one which is neither entirely 'fixed nor chaotic' with 'sufficient coherence based on a sufficiently constrained domain… (and) an openness to randomness in order to allow for the emergence of unanticipated possibilities…' (Davis & Sumara, 2006, p. 149). Complex curriculum, therefore, acknowledges children as complex learning systems that are not 'one size fits all' but self organising phenomena that are ambiguously bounded and operate at the edge of chaos. Change and unpredictability are thus considered integral elements of children's learning behaviours and practices.

In addition, viewing curriculum as a complex, self-organising and emergent process has important implications for the relationship between teacher and child and between the different nested layers of the education system in terms of its children, teachers, schools, communities, local authorities and governments. Again, relationships across this complex ecological system (Bronfenbrenner, 1979) differ when viewed from a complexity or a behaviourist perspective (see Table 6.4) leading to different pedagogical approaches by teachers and different management approaches by head teachers or managers.

Table 6.4 Viewing behaviour interactions as connective or hierarchical

The Complex Connective System	The Behaviourist Hierarchical System
• Developmental (bottom-up) • Shared vision • Nested • Collaborative • Negotiation • Networks • Deep learning	• Top-down • Absolutist vision • Unrelated • Solitary • Prescription • Bureaucracy • Surface learning

Whereas traditional behaviourist pedagogies control hierarchically through a 'leader' whose centralised and singular vision is transmitted in a prescriptive and top-down manner, the connectivity within a complex educational context results in a collaborative, negotiated, nested and bottom-up venture. From this more collaborative pedagogy a shared version of learning emerges (see Table 6.5). Traditional, behaviourist, pedagogical approaches are often characterised by children's isolation where learning often becomes superficial; comparatively, a connective pedagogical approach supports the creation of learning communities (Wenger, 1998) which engender interpersonal relations, shared knowledge, mutual engagement, and 'deeper' levels of learning (see Table 6.6). Wenger suggests that these learning communities 'hold the key to real transformation- the kind that has real effects on people's lives' (p. 85).

Table 6.5 Complex and behaviourist pedagogy (adapted from Morrison, 2003)

Complex Pedagogy	Behaviourist Pedagogy
• Active participation • Self-determined action • Collaborative experiences • Edge of chaos expectations • Open environment • Situated/authentic experiences • Formative feedback • Reflective evaluation • Scaffold experiences • Connected experiences	• Passive participation • Received action • Individualised experiences • Stable expectations • Closed environment • De-contextualised experiences • Summative feedback • Superficial evaluation • Fragment experiences • Compartmentalised experiences

Therefore, our view has increasingly become one where complex pedagogy promotes collaborative participation within learning communities that are open, situated and authentic (Wenger, 1998; Rovegno, 2006), and are supported by formative feedback and reflective evaluation. As noted at the beginning of Chapter Two, central to this situated learning perspective is the idea that knowledge is socially constructed in ways that reflect the children's culture (Vygotsky, 1978). From this perspective, we suggest that school-based education needs to reflect how these learning experiences are employed outside of the school and in broader learning communities. We therefore propose that children need learning contexts that offer authentic, meaningful and 'rich' tasks (Macdonald, 2004). Furthermore, we would suggest that regular engagement in this situated, authentic PE learning community will encourage

a self-organising learning trajectory which passes though periods of stability and chaos, with the periods of chaos likely to be highly collaborative, diverse, creative and rich (Morrison, 2008).

In comparison, a behaviourist pedagogy, which focuses on notions of hierarchy and certainty, results in a more individualized and passive engagement by the PE pupil and creates expectations of a linear and stable learning curve (see Table 6.6). In addition, the behaviourist pedagogical environment is more likely to be closed and de-contextualised with support from more summative feedback as well as more superficial evaluation. Thus, while the complex PE context scaffolds and connects children's learning experiences and leads to deep learning, a behaviourist approach predominantly promotes surface learning due to the fragmented and compartmentalised nature of the learning experiences in de-contextualised and closed contexts.

Although we advocate a complex vision for PE, we acknowledge that behaviourist pedagogies also have a role to play. We do not wish to present a complexity approach as 'good' and behaviourism as simply 'bad'. We propose there is an urgent need for a shift in emphasis from more traditional behaviourist notions of learning and knowledge to conceptions that emphasise uncertainty, edge of chaos and non-linearity. Subsequently, as the DPEG grappled with the creation of a developmental 3-14 curriculum, as will be discussed in the innovation efforts section, these notions from complexity theory have helped us begin to engage with the idea of a PE curriculum equating to notions of self-organisation and emergence.

A Complex View of CPD/professional learning

At the start of the delivery phase, I knew very little about how to disseminate Basic Moves to the teaching profession. As will be discussed later, this resulted in the initial DPEG professional learning activities being an intuitive and ill-informed mix of bottom up and top down CPD courses and it was not until I began to engage with complexity-oriented theories that I began to develop a more contemporary knowledge base about professional learning. Consequently, in line with notions of complex self-organising and emergent curriculum and pedagogy, we began to view professional learning from a similar perspective (Atencio et al., 2009, in press). Subsequently, as noted earlier, we became aware that the traditional diet of CPD courses has consistently been reported to be inadequate, unsystematic and superficial, leaving teachers dissatisfied and contributing little to their learning (Wright et al., 2008).

We set out to build on the research supporting the view that CPD is best when it is active (Day, 1999), reflective (Duncombe & Armour, 2004), on-going (Day, 1999) and collaborative (Hipp et al., 2008). In addition, we agreed with Wright et al., (2008) who propose that teachers' professional development is most effective when '*shared understandings and common language sustain innovations and reduce the stress of change*' (p. 51) and when they are allowed to reflect upon their practice. We began to suggest that complexity theory can help inform CPD agendas that aim to help teachers' better cope with and influence the curriculum innovation process. We have therefore proposed in line with complexity thinking that teachers'

professional learning is best when it is a self-organising and supported process that primarily takes place 'in situ'.

Within this complexity-oriented professional learning context, dynamic relationships between and amongst children, teachers, managers and policy makers are critical. We support Laroche , Nicol and Mayer-Smith (2007) who note that successful professional learning operates in collaborative ways according to the '*interconnectedness of and intercommunication among all parts of the system*' (p. 72) and can help teachers work innovatively and together in dynamic and unpredictable school conditions. Fazio and Gallagher (2009) similarly note that the interactions and knowledges found in successful professional learning groups '*behave in non-linear and unpredictable ways'* and suggest that *'using linear or reductionist principles fails to capture the inherent complexity of (sic) effective teacher development learning phenomenon*' (p. 2). Consequently, we have developed the view that professional learning environments should be organised around a range of key stakeholders so that close attention can be given to the collaborative and dynamic relationships that exist between these different individuals. Within this complex professional learning context, we suggest there is a place for traditional CPD courses to update, consolidate and extend individual's or group's professional learning and help them engage in the networks that exist outside immediate learning communities.

We have also become interested in how individual teachers and groups of teachers negotiate and cope with the edge of chaos moments that arise within each of their ambiguously bounded professional learning contexts. Once again, we agree with Laroche et al., (2007) who suggest that many collaborative educational environments

exist in a '*state of far-from-equilibrium*' and are marked by 'turbulence' (p. 73) which is likely to lead to new patterns of behaviour and knowledge (Phelps & Hase, 2002). This view has been supported by Morrison (2008) who suggests that as groups move towards the edge of chaos, they become more creative with the result that more 'diverse and rich' behaviours, ideas and practices emerge (p. 22). Consequently, we would suggest there is a need to consider how to support professional learning groups self-organise in such a way as to make the best use of those edge of chaos moments that create an 'emotional stir up' and break the complacency which often exists within the learning community (Lewin, 1947, p. 229).

Finally, while we acknowledge that collaborative and learning-oriented contexts provide an important vehicle for teachers' professional learning, we suggest that professional learning communities are 'messy' endeavours because they are likely to evolve in unpredictable and non-linear ways (Atencio et al., in press). Collaborative learning groups emerge and innovate relative to a complex combination of internal support *and* dissonance (Fullan, 2001).

While my curriculum and pedagogy knowledge in the early part of the delivery phase did not extend beyond the initial work at MMU, as I began to engage with complexity-oriented theories my knowledge base began to change. Notions of self organisation, emergence, ambiguous bounding, edge of chaos, connectedness and nestedness gradually began to inform and connect my thinking about developmental PE curricula, pedagogy and professional learning (Jess et al., 2011). In addition, although this complex ecological thinking has only passed an embryonic stage, it appears to have many connections with the more participative, open-ended,

interdisciplinary and collaborative developments in the Scottish curriculum (Scottish Government, 2009) and teacher education (Donaldson, 2010).

Relationships

The most noticeable feature of the DPEP delivery phase has been the number and nature of my working relationships. While internal relationships with a small number of colleagues played an important role during the foundation phase, attempting to disseminate an innovation across a large constituency has necessitated the development of relationships across a range of different internal, lateral and nested contexts (see Table 6.6). Although this table highlights the many different relationships I have experienced during this phase, it is important to highlight that DPEG members have been engaged in DPEG-related relationships across the education system, e.g. the development of specific curriculum areas, negotiations with local authority managers etc. However, the following section will consider key examples from my personal internal, lateral and nested relationships during this period.

Table 6.6 Internal, Lateral and Nested Relationships during the Delivery Phase

Internal Relationships (within PE Department)

- DPEG
- The PE department
- Undergraduate students

Lateral Relationships (across university and physical activity professions)

- The University
- The PE profession
- Class teachers
- Primary PE tutors
- Other physical activity professionals
- PE academics

Nested Relationships (local authority and national contexts)

- Local authority managers
- Government officials
- Professional associations

Internal relationships

The marginal status of primary PE in the PE department at the University of Edinburgh has resulted in two types of relationships over the last decade: a close collaborative relationship with the DPEG and a superficial relationship with PE colleagues and undergraduate B.Ed. students. As discussed earlier, the collaborative nature of the work with the DPEG has been fulfilling, rewarding and tense. With the DPEG focussed on designing, disseminating and evaluating a curriculum innovation, the time spent creating, reflecting on and re-examining the shared vision of what the Basic Moves and 3-14 innovations would look like and how these would be disseminated and evaluated has been key to the collaborative process. This iterative process has meant that while the group has developed shared vision and

practices and trusting relationships, it has had many 'edgy' situations as group members seek to cope with new developments, different roles and failures. In particular, because the curriculum innovations have all challenged traditional PE curricula and pedagogy, awkward meetings are now acknowledged as part of the development process as group members grapple with the different ways to view content and teaching approaches. As the group has grown in number and the DPEG's innovation efforts have extended conceptually and geographically, my role as the group leader has become more obvious, if only because I am now the only full-time member of the university staff in the group. In this role, I have become conscious of the need, for theoretical, pragmatic and emotional reasons, to distribute leadership roles around the group. Whilst sharing the different leadership roles makes cognitive sense, I have discovered this is often a delicate undertaking as the equilibrium of the group can be compromised, particularly when individuals feel pressurised or marginalised.

An important outcome of the group's engagement with complexity theory has been the growing awareness that the DPEG activities are self-organising and emergent events within ambiguously bounded parameters. Because the group have spent so much time discussing and reflecting on shared ideas and practices, meetings are rarely 'anything goes' and are never so constrained that the outcomes are predictable. Similar to my teaching experiences as a primary PE specialist, the DPEG has become a 'complexity laboratory' as meetings and activities are used to negotiate the edge of chaos possibilities within the ambiguous bounding of our ongoing development. While these ten years of the DPEG have been both a positive and fulfilling experience, it is important to acknowledge that developing the relationships that

sustain the curriculum innovation project is both complex, time consuming and, at times, uncomfortable.

Conversely, internal relationships with PE colleagues in the university PE department have been less collaborative and more superficial, with potential connections usually not being explored. As has already been discussed, this lack of connection with immediate colleagues is, in part, because of the 'indigenous knowledge' syndrome which stems from long held beliefs and practices being deeply embedded in the immediate context with the result that innovations or different ideas are considered incompatible and are rejected. As the DPEG innovation efforts have expanded, this 'indigenous' issue has been a recurring theme at the internal, lateral and nested levels of the system and has been difficult to address, particularly when views are deeply entrenched and when meetings with colleagues may be infrequent. However, recent developments in the university, which include significant staff changes, have resulted in the PE group developing a broader view for the future of PE and the DPEG gradually connecting more closely with various members of the PE learning community.

Lateral Relationships across the Profession

Since 2001, members of the DPEG have interacted with thousands of professionals and academics across Scotland and the UK, mostly in contexts related to the onward dissemination of our curriculum innovation efforts. While the specific nature of these professional learning activities will be discussed later, this section considers some of the key relationship issues that have emerged from our work with PE teachers and academics, class teachers and other physical activity professionals. Most of these lateral relationships have tended to take the form of CPD sessions

which have helped disseminate aspects of the DPEG's innovation agenda and, in the main, have been very well received (Atencio et al., in press; Elliot et al., under review).

Again, it has been the response of primary PE specialists, the 'indigenous experts', that has been the most intriguing. Many specialists have enthusiastically endorsed our Basic Moves and the 3-14 curriculum efforts, and now work closely with the DPEG. For example, two specialists, one based in Aberdeen and another in Carlisle, regularly travel to Edinburgh to support the delivery of the DPEG courses and activities. However, other primary PE specialists have been less convinced of our curriculum innovation efforts and a small number have overtly demonstrated their dissatisfaction in both verbal and written feedback. For example, in 2005 to 2006, on two separate occasions, specialists were so enraged with our approach to curriculum innovation and CPD that formal meetings were needed to 'clear the air'. While many of the issues raised by these specialists were similar to those negotiated in early DPEG development meetings, these enraged specialists noted how they felt patronised by the top-down, 'filling the empty vessel' approach we had taken towards their professional learning. As a consequence, whilst these 'very edgy' meetings are now much less common, there remains a group of primary PE specialists, key stakeholders, whose continued lack of engagement with the DPEG highlights the damage caused by these early, ill-informed dissemination attempts.

Although the number of non-involved specialists has been relatively small the impact of their negative reaction has been an important learning experience for the DPEG

for two main reasons; a small number of 'indigenous experts' can act as 'gatekeepers' to a large number of primary schools (see below) and a more participative approach to professional learning is an essential consideration with 'indigenous experts', even although this is likely to be uncomfortable and tense.

More recently, and largely because of the relationships developed during the two-year part-time postgraduate certificate in 3-14 PE, individual members of the DPEG are now collaborating more closely with increasing numbers of PE specialists, class teachers, active schools coordinators, lecturers and academics in various forms of professional and academic work. Consequently, and learning from our previous mistakes, we are in the process of creating primary PE networks across specific curriculum initiatives (e.g. outdoor journeys, sport education, early moves). While this lateral capacity building exercise is in its early days, it has been identified, with colleagues from the PE profession and Scottish Government, as a critical factor in consolidating and extending the recent progress made within primary PE.

Nested Relationships

While most of the DPEG's relationships have been with internal and lateral contacts, nested relationships with key stakeholders at the different micro, meso and macro authority levels have become critical to the ongoing development of the group (see Figure 6.2).

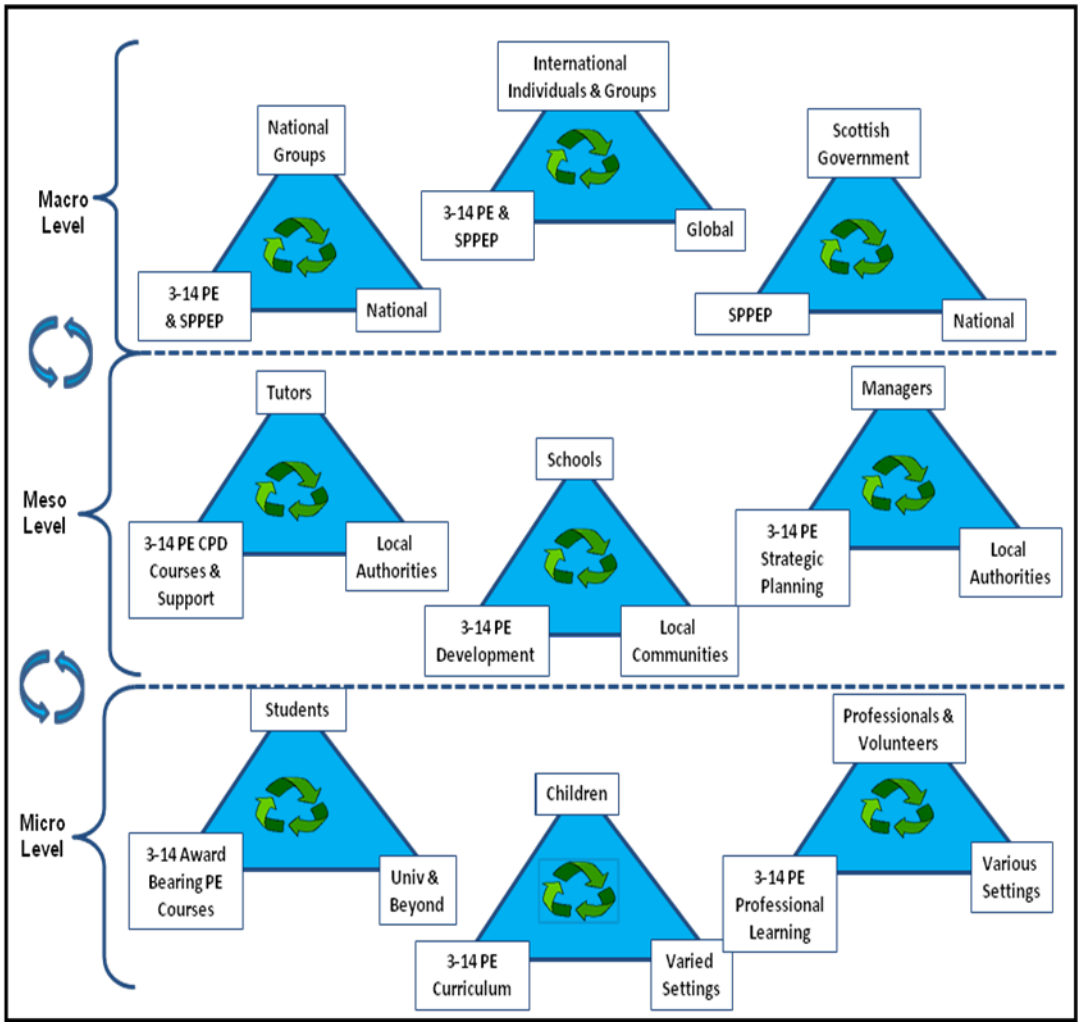

Figure 6.2 The Nested Nature of the DPEG Relationships

While local authorities may have lost much of their power in England (Ball, 2008), Scottish local authorities still have significant influence on the activities which are, or are not, introduced across their authorities. For example, support from senior managers in East Lothian facilitated the pilot Basic Moves project for almost five years (Jess, Atencio, Koca Aritan, Deconinck & Murray, 2007), and over the years, there has seen support and development across numerous other authorities in Scotland and England. However, a number of local authority managers have acted as 'gatekeepers' to ensure the DPEG's curriculum innovation efforts have not been

introduced to schools in their authority citing finance, lack of interest and specialist teacher rejection as the main reasons. Consequently, relationships with local authority managers have either facilitated or constrained our dissemination efforts.

While developing relationships at this macro level proved almost impossible in England, the situation has been different in Scotland. Not only is the country much smaller i.e. five million as opposed to 50 million, but the post-devolution policy-making context has been much more participative. As a senior member of the only PE higher education institution in Scotland, I have had more opportunity to meet with, and therefore influence, key stakeholders across the different nested levels of the education system. As it has transpired, with my developmental curriculum innovation agenda and the opportunity to advocate at the national level, I have spent the last decade developing some relationships across the nested, national context and have been able to witness some support for a developmental PE agenda within national developments (e.g. Scottish Executive, 2003a, 2004b; HMIe, 2001). In addition, with most of the DPEG's funding in the form of grants from Scottish Government and sportscotland, the importance of developing and sustaining positive working relationships with key stakeholders cannot be overemphasised. While I may not feel emotionally suited for engagement in these national activities, many of the opportunities for the DPEG would not have emerged without an engagement in these events.

The nature and number of my, and the DPEG's, working relationships internally, laterally and across the nested levels of the education system have become the most tangible difference between the foundation and delivery phases of the DPEP. Not

only have these relationships helped disseminate the curriculum innovations far beyond the immediate context, they have assisted with the ongoing curriculum innovation efforts that lie at the heart of the DPEP (e.g. Beames & Atencio, 2008; Jess et al., in press). These relationships have become the key to creating the developmental PE innovation as a 'connective specialism' (Penney & Chandler, 2000).

Section summary

From a capacity building perspective, the delivery phase has built on the progress made during the foundation phase in many different ways. Specifically, the more complex nature of the recent innovation efforts has not only necessitated a more comprehensive and contemporary vision for developmental PE, but has highlighted the need to develop a more extensive curriculum, pedagogy and professional learning knowledge base. Critically, the delivery phase has also required that much more attention has been given to the different internal, lateral and nested relationships needed to consolidate and extend the development and dissemination of the different integrated curriculum innovation efforts.

6.5 Innovation Efforts during the DPEP Delivery Phase

Since September 2001, from a more encouraging starting point, various contextual factors and personal capacities have influenced the DPEG's engagement in a decade of curriculum innovation. In particular, close alignment to national policy, income generation, a reworked and extended complexity vision of developmental PE, an extended knowledge base, and many more relationships with stakeholders across the nested levels of the innovation context, have all had an impact on the DPEG's

curriculum, pedagogy and professional learning innovation efforts. To describe these efforts in depth this next section will focus on two distinct but related sections:

1. The DPEG Curriculum & Pedagogy Innovation Efforts, i.e. the curriculum innovation
2. The DPEG Professional Learning Efforts, i.e. the process to disseminate the curriculum innovation

The DPEG Curriculum and Pedagogy Innovation Efforts

In 2001, because my recent work focus had been on the studies for my first PhD attempt, my engagement with the developmental PE curriculum had not moved forward since the mid 1990s. Consequently, the structure of the Basic Moves programme (Jess, Dewar & Fraser, 2004) mirrored the earlier CMC programme (Child Movement Centre, 1994) which had focused on the development of children's generic movement competence and key cognitive, social and emotional factors that supported the adaptability and creativity to enhance participation in physical activities across the lifespan (Jess & Collins, 2003; Bailey, et al., 2009). In addition, to enhance the lifewide nature of Basic Moves (Penney & Jess, 2004), the programme was created as a cross-sector programme to be offered in curricular, extra-curricular and community contexts. This move was generally supported by different agencies and, in particular, by some members of the national Active Schools Programme who noted that 'Basic Moves allowed the Active Schools Programme to make a real impact in after school activities…hitting a previously untapped age group' (Jess et al., 2007). Within a very short period of time, Basic Moves was endorsed by the national physical activity strategy (Scottish Executive,

2003a), had a successful conference launch in March 2003 with over 200 delegates and became integrally linked to the Scottish Executive's 'learning to move' and 'moving to learn' agenda (Scottish Executive, 2004b). Therefore, whilst my notions of an early years developmental movement curriculum had been rejected during my time in England, the Scottish policy context proved much more accommodating and supportive. Basic Moves, as a curriculum innovation, was more compatible with education, sport and health policy in Scotland and had a much better chance of succeeding (Rogers, 1995). Consequently, because of this perceived compatibility, the uptake for the Basic Moves activities was particularly encouraging in the period between 2004 and 2006.

However, whilst the structure of Basic Moves remained the same, the DPEG increased its efforts to address the pedagogical shortcomings of the traditional activity 'block model' (Jess, 2004). Initially introduced as community clubs, Basic Moves was soon integrated into seven primary schools in Edinburgh and East Lothian. Two key delivery issues were addressed in an effort to enhance children's movement and associated learning in different contexts. First, it was proposed Basic Moves should be introduced over an extended period of time to eventually replace the existing short blocks of games, gymnastics and dance. This extended experience was specifically set up to enable the teachers to focus on the children's core Basic Moves learning (Penney & Chandler, 2000), a move that articulates with the order generating rules principle presented in Chapter Three.

Early in the dissemination process, this suggestion was enthusiastically supported by many early years practitioners and feedback increasingly documented changes being made in a number of areas across the country. The masters dissertation of one of the

DPEG members offered important feedback on our efforts during this period (Dewar, 2007). For example, one influential primary PE specialist, who acted as curriculum manager for a large city authority, noted she had '*basically binned the block system for our infants (5-7 year olds)*' (Dewar, 2007). Another semi-rural local authority approached the change process more slowly with Basic Moves initially introduced as an additional six week 'block' but, following detailed discussions, included the programme as the PE programme throughout the first three years of children's schooling throughout the authority. Significantly, for many teachers, the deeper impact of this structural change was soon apparent, with one teacher highlighting how this different approach to the early years curriculum '*allowed me to delve deeper into what I was actually teaching… before you were just scratching the surface, you were teaching the children for five or six weeks, but then the next time you saw them it was back to square one again*' (Dewar, 2007).

A second pedagogy change focussed on offering children opportunities to actively engage in appropriate amounts of independent or self-organising practice to consolidate and deepen their learning. This structural change had come about following observation of primary teachers' classroom practice and discussions with these teachers resulted in Basic Moves sessions encompassing a mix of whole class teaching, teacher intensive group work, teacher non-intensive consolidating group work and applied activities like games, gymnastics and dance.

The introduction of 'learning stations' was a topic of significant collective interest for the DPEG and efforts were not only made to articulate their importance, but highlight the complex nature of stations as a recurrent feature of Basic Moves sessions (Graham, 2001; Jess, 2004). During this section of Basic Moves sessions,

it was suggested that between three and six 'learning stations' be set up, to enable groups of children to independently practise and consolidate their different travelling, object control and balance activities before moving onto the next station. At one station, the teacher had the opportunity to work closely with one of the groups to focus on key aspects of the children's learning, whilst the groups at the teacher non-intensive stations could undertake consolidating tasks set by the teacher but performed in a self-organising manner. Although the setting up and monitoring of stations proved organisationally problematic for class teachers in the early stages, feedback increasingly suggested that teachers were more focussed on practices geared towards children's learning. For example, one specialist teacher reported that '*formative assessments are...of a better quality as a result of teaching-intensive stations and having more knowledgeable staff*' (Dewar, 2007). In addition, sessions were set up to include opportunities for children to apply their generic learning in increasingly more complex games, gymnastics and dance contexts, prompting one teacher to say the following:

> *our programme is Basic Moves for the whole year. But for me to connect dance activities with games activities with gymnastic activities in the one session was quite profound and actually took me quite a long time to adjust to…But the longer I did it and the more I got used to it, the more profound it actually was in terms of the impact it was having on the children.*
>
> (Dewar, 2007)

While the structure of Basic Moves consolidated my earlier work, the longer and more focussed 'blocks' offered the DPEG the opportunity to experiment with an

emergent pedagogy. This development clearly linked to children's active learning within clearly defined contexts and encouraged self-organisation, emergence and learning opportunities connected to more applied contexts. Importantly, this approach articulated closely with many of the active learning concepts presented by the Scottish Government (Scottish Government, 2007).

While progress was being made, a number of issues emerged to highlight the complex nature of the curriculum innovation process. From a technical movement perspective, with the biomechanical mature movement patterns from motor development research included as a key component of Basic Moves (Wickstrom, 1978; Seefeldt & Haubenstricker, 1982; Roberton & Halverson, 1984; Jess, 2004), the 'allure of certainty' (Morrison, 2003) in the form of a 'correct' mature movement pattern became a dominant feature of Basic Moves instruction. As a result, to ensure their children could perform the mature or 'gold standard' movement, many teachers reportedly employed a more behaviourist pedagogy which focused on prescription. Little attention was being given to children's exploration of movement concepts with the result that adaptability and creativity were marginalised (Atencio et al., in press). In conversations over the intervening years, it has become apparent that critics of Basic Moves perceived this overemphasis on the technical component as being 'ghastly'. Additionally, although these initial efforts focused on the key age range to develop children's PE foundation (Scottish Executive, 2004b), the DPEG was aware that any significant change would depend on the influence Basic Moves would have on curriculum beyond the five to seven age group, i.e. the preschool and the upper primary and early secondary (UPES) years.

By 2006, it was apparent that teachers' negotiation of Basic Moves by employing a direct teaching approach focussed on 'correct' movements proved to be a significant limiting factor. Based on our observations of many workshops, and feedback provided by over 2,000 teachers and physical activity professionals attending Basic Moves courses by 2006 (Jess, 2006b), we set out to re-orient the programme by explicitly extending the age range to cover the 3-14 years. Our work would increasingly be underpinned with notions of complexity, constructivism, ecology and dynamical systems theories (Jess et al., 2011).

In late 2006, with the original visions for developmental PE unable to accommodate the transition to cover the 3-14 age range, the DPEG curriculum and pedagogy agenda explicitly moved into its second phase. Initial meetings to connect Basic Moves to the younger pre-school and older upper primary early secondary (UPES) contexts were chaotic, ill-informed and mostly unsuccessful. However, progress began to be made as principles from ecological theory (Newell, 1986), dynamical systems (Thelen & Smith, 1994), and situated perspectives (Lave & Wenger, 1991) started to influence different elements of our curriculum agenda.

These theories challenged the notion of 'correct' movements and emphasised the exploratory and non-linear nature of young people's movement development in relation to task and environmental constraints (Haywood & Getchell, 2009). At the same time, social constructivist (Vygotsky, 1978), and situated learning perspectives (Lave & Wenger, 1992), provided the basis for movement learning opportunities that were more collaborative and 'authentic'. In addition, complexity theory, with its focus on self-organising, emergence, adaptability, non-linearity, and connectivity (Morrison, 2003), helped frame these different theoretical approaches and gradually

became the theoretical perspective underpinning the DPEG's most recent work (Jess et al., 2011).

Consequently, we have become more confident to question motor development approaches proposing the certainty of 'correct' movement patterns and have come to increasingly acknowledge that children's movement development is an emergent and iterative process involving a complex mix of children's active exploration, maturation and previous experiences supported by the different opportunities encountered (Thelen, 1995). This has helped us shift from a view of children's movement learning as certain and specific to one more akin with emergence and uncertainty. The idea of one 'correct' movement pattern for all children is replaced by the notion of different 'best fit' movement patterns which each child performs as a result of the interaction between their current capabilities, the task being attempted and the environmental conditions present (Newell, 1986). Movement learning, therefore, is no longer considered as 'one size fits all' but as a self-organising, emergent process influenced by many different factors, in different contexts and at different times (Gagen & Getchell, 2006). This view highlights the ambiguously bounded nature of children's movement development and connects, unwittingly, with our technical, adaptable and creative (TAC) approach that had been a central part of Basic Moves (Jess, 2004)

From a pedagogy perspective, the idea that children learn to move through exploratory and non-linear processes relative to changing and dynamic contexts has raised important questions about the nature of the learning experiences that teachers should prepare for children. With few PE examples incorporating this self organising emergent approach (Gagen & Getchell, 2006; Chow, Davids, Button,

Shuttleworth, Renshaw & Araujo, 2006; 2007), we have been largely left on our own to develop pilot projects in preschool (Verheul & McIntyre, 2008; Jess & McIntyre, 2009), and primary school contexts (Jess & Irvine, 2009) that focus on exploratory and open-ended tasks within different environmental settings.

During these exploratory, often child-initiated, activities we have observed children and have engaged them in discussions before using guided discovery techniques to gradually 'nudge' their movement in directions that help them demonstrate adaptability, creativity and efficiency in their movement patterns and associated learning. For instance, in the pre-school setting we have set up contexts which 'encourage' the children to engage with sending, particularly throwing, activities from which we are able to commence the 'nudging' process (Verheul & McIntyre, 2008). A prescriptive, teacher-led pedagogy is being replaced as we construct learning contexts in which young children are actively encouraged to construct and self organise their own and their peers' learning experiences; in this way, the young people themselves become motivated to find their own solutions within specific environmental and task 'constraints' (Newell, 1986).

Instead of a 'top-down' model which positions teachers and other adults as 'experts', emphasis is being placed on the sharing of learning intentions between children and teachers, through the posing of problems, encouragement of dialogue and critique, and the scaffolded discovery of movement patterns. At the same time, these learning contexts have been set up to recognise and support children's edge of chaos explorations so that they come to view 'mistakes' as an important, necessary and even enjoyable part of the movement learning process. Consequently, our

complexity-informed ideas have increasingly informed the way in which we now approach young children's movement learning.

In addition, the DPEG has moved beyond the narrow age range of Basic Moves into the Upper Primary and Early Secondary (UPES) years, where concerns about the multi-activity curriculum model are even more in evidence with more activities being added to the curriculum list (Scottish Executive, 2004b; Penney, Jess & Thorburn, 2006; Jess, Haydn-Davis & Pickup, 2007). In particular, as noted earlier, the 'PE-as-sport-techniques' approach (Kirk, 2010) emphasises the lack of connectivity between the different elements of the programme. Subsequently, our UPES work acknowledges, and focuses on, the importance of core psychomotor, cognitive, social and emotional learning which moves beyond Basic Moves and is needed to facilitate children and adolescents' participation in many physical education activities (Council on Physical Education for Children, 1992; Penney & Chandler, 2000; Bailey et al., 2009), (see Table 6.7).

Table 6.7 Examples of Core Learning in the Developmental UPES PE Curriculum

Psychomotor	• Basic Movement Combinations • Health & Performance-related Components • Physical activity lifestyle: tracking
Cognitive	• Critical thinking and decision making skills • Principles of performance and practice • Health and recreational issues • Etiquette
Social	• Social learning skills • Individual and team behaviours • Roles and responsibilities • Cooperation, inclusion and competition
Emotional	• Task and ego behaviours • Self-determination • Physical identity • Emotional intelligence • Coping strategies

Although aspects of core learning are regularly acknowledged in the multi-activity physical education model, we have continued to argue that the fragmented and compartmentalised nature of the traditional curriculum model results in core learning usually being marginalised and rarely developed within a situated and authentic context (Jess et al., in press). This de-contextualised and isolated approach leads to superficial learning experiences which do not reach 'deep' and transferable learning levels required. Consequently, we are working to deconstruct the traditional curriculum model to ensure core learning has a central role in the developmental PE curriculum and pedagogy efforts and also connects and transfers to situated and authentic learning contexts (Jess et al., 2007). We have presented an UPES curriculum model which clearly articulates the connections between core learning

and, what we have termed, developmental applications and authentic applications (Jess et al., 2007). Developmental applications have similarities to the traditional activity short 'blocks' as they are taught for short periods of time and focus on specific activity contexts (e.g. games, gymnastics and dance). The key to these developmental applications is that they are specifically designed to connect core learning with the more 'real life' learning experiences of the authentic applications. They could also be described as transitional applications. Based on ideas from situated learning theory, authentic applications take place for longer periods of time and aim to further develop core learning and developmental applications by contextualising them in 'real-life' situations across and beyond the school curriculum. Examples of authentic applications include Sport Education (Siedentop, 1994), outdoor journeys (Beams & Atencio, 2008), and dance education (Irvine, 2009)

We have grappled with the best way to organise an UPES curriculum by piloting programmes which either include a core learning session each week linked to other sessions focused on authentic contexts (Penney et al., 2006; Jess et al., 2007) or which subsume core learning within existing examples of authentic curriculum developments like TGFU and Sport Education. For example, we have explored the integration of core learning principles and movements in the context of Sport Education (Jess et al., in press). We have done this by asking young people to problematise the game of 'rounders' and to propose changes to the rules in order to make it more socially inclusive (e.g. getting more people involved in the game). In groups of eight, the young people presented their alternative version of 'rounders' to their peers, and collectively the class decided upon which version of the game they

preferred to play. Furthermore, during the Sport Education season, the young people were asked to create several learning stations during practice times in order to help each other develop the basic movement skills to more effectively participate in the 'rounders' game (e.g. catching, throwing, striking, and running). Evidence such as this suggests that young people are beginning to make connections across their PE experiences and the wider primary school curriculum (Scottish Government, 2009).

While it is too early to judge the full impact of this combined core and authentic learning curricular approach, early evidence suggests that young people are beginning to identify connections between core learning and the authentic applications they encounter, in line with 'a constructivist view of knowledge' (Light, 2008, p. 23). In supporting this scaffolding process, we emphasise that young people's movement activities are comprised of 'complex, dynamic, unpredictable, and even chaotic' (Light, p. 30) behaviours and practices so that teachers need to refrain from 'using too rigid a syllabus' (Doll, 2008, p. 202) in order to be creative and adaptable in their pedagogy, as there are no set outcomes or linear models of delivery.

Section Summary

While the initial Basic Moves programme was well-supported by a robust developmental rationale, the actual programme was similar, although more detailed, to my original curriculum efforts in the mid-1990s. Subsequently, it was not until the DPEG began to make efforts to develop an extended 3-14 PE curriculum that the limitations of this narrow developmental approach became apparent. However, following a turbulent edge of chaos period, when different ill-informed curriculum

approaches were unsuccessfully attempted, engagement with more complexity-oriented perspectives has led to curriculum efforts that now align with notions of self-organisation and emergence and connect more comfortably with contemporary PE (Kirk, MacDonald & O'Sullivan, 2006), and Scottish education (Scottish Government, 2009) agendas.

The DPEG Professional Learning Innovation Efforts

While these curriculum and pedagogy sections directly relate to the development of Basic Moves and then 3-14 as DPEG innovations, the process by which these innovations has been, and is being, disseminated to a wider audience is through professional learning activities for teachers and physical activity professionals. While professional learning activities were relatively limited during the foundation phase, the appointment of DPEG staff almost immediately led to the Basic Moves dissemination process starting immediately in September 2001. Subsequently, the remainder of this section will consider the professional learning efforts of the DPEP delivery phase in two related sub sections: the Basic Moves professional learning efforts, followed by the 3-14 professional learning efforts.

Basic Moves Professional Learning Efforts (2001 until 2006)

From a professional learning perspective, while the initial efforts to simultaneously develop and disseminate Basic Moves started relatively slowly in 2001 to 2002, the period from 2004 to 2006 was one of rapid and generally uncontrolled expansion, which ultimately led to a re-focusing of the DPEG's innovation efforts. This uncontrolled expansion was in part due to the prevailing policy conditions which raised the national profile of basic movement competence (Scottish Executive,

2004b), and Basic Moves in particular (Scottish Executive, 2003a), and resulted in a significant uptake of the DPEG's professional learning activities. As a consequence, the DPEG developed two distinct and largely intuitive professional learning approaches: a traditional top-down short course approach and a more collaborative and extended learning communities approach.

Given the long held marginal status of early years PE, the traditional short course approach to the Basic Moves professional learning project progressed to support the rising profile of early years PE in line with the recent government documentation (HMIE, 2001; Scottish Executive, 2003a). Following the first Basic Moves National Conference in 2003 and introductory Basic Moves courses with Active Primary School coordinators[13] from around Scotland, the professional development component of the DPEG's work expanded to a nation-wide scale with the introduction of the Basic Moves Training Programme in March 2004. This programme ambitiously consisted of two-day courses for Level One and then Level Two and specifically aimed to move beyond the 'tips for teachers' approach by explicitly challenging teachers' perceptions of early years PE before offering pedagogical advice about the delivery of Basic Moves. These university-based courses attracted in excess of 200 practitioners in one year and received overwhelmingly positive evaluations from most delegates (Dewar, 2007). However, it became apparent that, while Basic Moves may be addressing a status

[13] 'Active Primary School coordinators' are part of the Active Schools Programme managed by sportscotland, the national agency for sport. The main remit of the Active Primary School Co-ordinator is to develop ways to get children participating in regular physical activity. This includes activities like walking to school, play, dance, sports and games. These positions are full-time, with each co-ordinator responsible for a 'cluster' of primary schools and associated pre-five establishments. (sportscotland, 2006**)**

issue, too much reliance was being placed on the top-down CPD model, as the off-site delivery meant delegates were expected to return to their own communities without any on-going support. It became unclear what was happening in schools and communities, although it was reported that numerous delegates stopped teaching Basic Moves as they felt isolated as the only teacher in their school using the programme. In addition, as has been discussed in some detail earlier, positioning teachers and other deliverers as 'empty vessels' (Morrison, 2008) was problematic for some experienced physical activity professionals, particularly the 'indigenous experts', the primary PE specialists. While on-going reflection and evaluation revealed many encouraging aspects of this CPD work, particularly the depth and detail of the content and its more inclusive focus (Dewar, 2007; Jess, et al., 2007), it was clear there was a need to reorient the nature of our professional learning if the DPEG was to address the problems inherent in using a traditional top-down approach. Specifically, to sustain Basic Moves it became increasingly apparent there was a need for professional learning experiences that were more situated, collaborative (Armour, 2010) and, critically, differentiated to meet the needs of the different groups of professionals.

Fortunately, a more collaborative professional learning approach had been taken in the localised Basic Moves pilot project in East Lothian. This small-scale project was set up in 2002 around three clustered East Lothian primary schools feeding into the same high school with the aim of creating a context in which Basic Moves could be developed and supported. Discussions with senior local authority managers, head teachers and specialist teachers had appeared to create a supportive starting point for

the project, although ‘edgy’ experiences arose when one head teacher refused to be a part of the project and at least one of the primary PE specialist teachers was not overtly enthused by Basic Moves. However, with the regular presence of a core DPEG staff member working in the primary schools, on-site Basic Moves training courses, support seminars and collaborative learning opportunities for staff in the three schools, many of the issues raised were negotiated and support mechanisms quickly installed. By 2006, Basic Moves had become embedded in over thirty primary schools across the local authority and the DPEG had started to learn a considerable amount about the importance of supporting staff following introductory professional learning activities (Jess et al., 2007).

As the DPEG began to acknowledge the complexity of the professional learning process and engage with the professional learning literature (Day, 1999; Armour & Duncombe, 2004) a Basic Moves tutor programme was introduced in late 2005 (Jess, 2005). The specific intention of this programme was to create a network of tutors who could deliver and support Basic Moves developments within their own local authorities and/or communities. The tutor programme attempted to re-focus Basic Moves as a bottom-up project moving away from the top-down university-based programme to a more collaborative venture with leadership and ownership of developments distributed across the range of tutors in Scottish and English local authorities. However, these projects evolved in different ways to fit with local aspirations and needs. Some authorities engaged enthusiastically and put support mechanisms in place (Jess et al., 2007), while others, for the range of reasons noted earlier, did not ‘buy-into’ the project.

In one group of authorities, the development process took some time as individual tutors worked with colleagues at the different nested levels within their authority to move the project forward. Crucially, by slowly building capacity, these Basic Moves tutors had developed more ownership of the project and usually came up with a range of creative projects to enhance the development process (Dewar, 2007). However, during this reorientation of the Basic Moves professional learning to a tutor-led programme, it became apparent that most local authorities continued to approach PE-CPD in a traditional manner by offering teachers a programme of short, top-down and off-site courses. In reality, the Basic Moves tutor programme mostly served to transfer the top-down nature of Basic Moves from a national level to the more local level. Subsequently, while the DPEG was aware that a shift towards more collaborative and situated professional learning was desirable, this was proving challenging to manage. With many localised projects now taking place throughout Scotland and England, the rapid growth in numbers put increasing pressure on the small DPEG staff to support colleagues. More specifically, this highlighted the need for a coherent distributed leadership system that could work to consolidate and extend the Basic Moves programme in local contexts. However, as will now be discussed the DPEG's professional learning programme was to move off in a related, but non-linear direction.

3-14 PE Professional Learning

Towards the end of 2006, as the DPEG's curriculum and pedagogy efforts began to extend across the 3-14 age range, the DPEG was offered the opportunity to consolidate and extend both its curriculum and professional learning innovation activities. In conjunction with the University of Glasgow, the group was

commissioned by the Scottish Executive to develop, deliver and evaluate the impact of two new postgraduate masters-level certificates in primary PE. At the University of Edinburgh this qualification was titled the PgCert in 3-14 PE. The two programmes were specifically created in response to the recommendations of the PE review group (Scottish Executive, 2004b) and were set up to enable primary class teachers develop a specialism in PE. In addition, it was projected that these programmes would set the platform for a national primary PE-CPD programme. Open to all registered teachers in Scotland the project was originally allocated 400 places in line with the PE review group recommendation (Scottish executive, 2004b). However, with the increased national profile of primary PE and children's physical activity, the response to the project, later named the Scottish Primary PE Project (SPPEP), has been more positive than originally anticipated (Jess, Campbell, Atencio & Elliott, 2009).

Now entering its sixth year in excess of 1200 teachers from all 32 local authorities have enrolled on these programmes and with just over 2000 primary schools in Scotland, the scale of the project has exceeded original expectations and has helped move primary PE from the margins of Scottish education. From a DPEG perspective, the project has not only led to the expansion of the group but has helped re-focus and extend our curriculum and professional learning activities. In particular, as we engaged with complexity-oriented theories (Jess et al., 2011), we began to draw much closer connections between our curriculum, pedagogy and professional learning innovation activities. Subsequently, while the 3-14 programme set out to explore complex primary PE curriculum and pedagogy with the teachers, we have

gradually started to build on the CPD literature to specifically focus on the self-organising, collaborative, situated and emergent nature of the teachers' professional learning.

A key outcome has been the use of more participative and situated pedagogy approaches with teachers. In particular, we now more overtly acknowledge the importance of the teachers' initial conditions and the self-organising and emergent nature of their learning as they return to their schools and create PE programmes that develop along different pathways because of their different contexts, knowledge, interests and needs (Atencio et al., in press). We are now encouraging 3-14 teachers to adopt leadership roles in their schools in order to develop primary PE learning communities that reflect contemporary innovation agendas (e.g. Wood & Jess, 2009; Begg & Watson, 2010; Hutt, 2011; Jess et al., in press).

In addition, with colleagues from Glasgow University, we are undertaking a longitudinal project (Atencio, Campbell, Jess & Elliot, 2010) to track the impact of the postgraduate programmes on teachers and their practices. In its early phase of development, this project is currently building on initial baseline data (Elliott, Atencio, Jess & Campbell, under review) and investigating the impact of the post graduate programmes on teachers competence, confidence and collaborative endeavours in schools (Thorburn, Carse, Jess & Atencio, in press; Atencio, Elliott, Jess & Campbell, under review). As yet, my personal engagement with the research aspect of the project has been more strategic and in a 'third author' capacity, primarily because of the complexities associated with more applied delivery aspects

of the project. However, with many localised projects now underway around Scotland, the future of the Scottish Primary PE Project (SPPEP) project will move to capture the self-organising, non linear and emergent nature of teachers' personal PE projects. Consequently, a next crucial step is to set up robust networking opportunities for these teachers to not only help the DPEG support the teachers in schools, but to encourage teachers to develop and maintain lateral contacts with colleagues working in similar contexts.

Section Summary

While professional learning activities were minimal during the foundation phase, as Basic Moves 'took off', my understanding of the professional learning processes needed for the effective dissemination of the innovation were lacking. Consequently, our original CPD dissemination efforts soon became chaotic and were hampered by many of the problems inherent in traditional CPD programmes. However, the introduction of the more intensive postgraduate certificate in 3-14 PE, aligned with our engagement in complexity-oriented theories, re-focused our thinking about professional learning and has resulted in the DPEG now seeking to develop a more self organising, participative and collaborative approach to professional learning.

6.6 Chapter Summary

Within a positive national context, with appropriate funding and a group of teachers and researchers engaged in a collaborative project over many years, the DPEG has been engaged in a decade of sustained curriculum innovation and dissemination.

Although much of this activity has been successful, this chapter has highlighted how the problematic period from 2005 to 2007 necessitated a significant paradigm shift, which was to extend the DPEG vision towards more complexity-oriented principles. As a consequence of this theoretical shift, the DPEG now engages in curriculum, pedagogy and professional learning activities from a more self-organising, emergent and connected perspective. Building on the more isolated nature of my experiences during the foundation phase (Chapter Five), this chapter has highlighted how a different set of contextual, personal and collaborative factors have created a context for the growth and expansion of the DPEP. Subsequently, on the basis of the data presented, the next chapter, Chapter Seven, will explore the potential usefulness of the CEA to support teachers in their engagement and negotiation with the curriculum innovation process.

Chapter 7: The DPEP: A Complex Ecological Phenomenon?

7.1 Introduction

This chapter, the third of the DPEP chapters, sets out to explore if the evidence from my DPEP narrative in Chapters Five and Six offers support for a CEA to curriculum innovation (see Figure 1.1 on page 10). To frame this exploration reference will be made to the three main questions posed earlier in the thesis.

Question 1

How have the different contexts in which I have worked influenced my developmental PE innovation efforts over this 24 year period? In particular, what has been the impact of key macro, meso and micro ecological factors at the different nested levels of the education system?

Question 2

How have my evolving personal capacities influenced my developmental PE innovation efforts? Specifically,

1. How have my directional capacities influenced the focus and trajectory of my innovation efforts?
2. How have my integrating capacities influenced the connected nature of the innovation efforts?

Question 3

What evidence is there to support the proposal that the nature of my innovation efforts over the lifespan of the DPEP has been complex? In particular, what evidence is there that these curriculum innovation efforts have been self-organising, emergent, non-linear, ambiguously bounded, connected and nested?

Consequently, these three questions will be discussed in three sections:

1. The Influence of Context on the DPEP Innovation Efforts

2. The Influence of Capacities on the DPEP Innovation Efforts

3. The Complex Nature of the DPEP Innovation Efforts.

On the basis of these discussions, the chapter will conclude by presenting a summary of the DPEG's current complexity-informed curriculum, pedagogy and professional learning efforts and by considering the potential role of the CEA in future curriculum innovation agendas.

7.2 The Influence of Context on My Innovation Efforts

This first section considers the extent to which the different macro, meso and micro contexts in which I have worked have influenced my innovation efforts over the 24 years of the DPEP.

Macro Contexts

Although my work has been mostly removed from the national context, each of the policy landscapes I have experienced has had a significant influence on the nature of my curriculum innovation efforts. Over the years of the DPEP, these influences

have been based on two key factors: the specific nature of the policy context and the compatibility of my innovation ideas with these different contexts. From the perspective of my developmental PE agenda, the most notable feature of the different policy contexts has been the contrast between the top-down, neo-liberal policies of 1990s England and the more participative, egalitarian approach taken in post-devolution Scotland. Specifically, these differences led to my innovation efforts in England being marginalised and restricted by the more 'traditional' multi-activity national PE curriculum (DES, 1992) whilst the wider curriculum parameters in Scotland have offered considerably more opportunity for experimentation and innovation (Scottish Executive, 2004a; Scottish Government, 2009).

In addition, the extent to which my intentions have been compatible with the dominant policies of the time has also impacted on the nature of my innovation efforts. For example, as my confidence and aspirations grew at MMU, I was acutely aware that the nature of my developmental vision was at odds with the traditional sport programme being actively pushed by the conservative government in England. Not only was I out of sync with this restorationist agenda, but also with the narrow top-down dissemination process being employed by the government agencies. As my developmental ideas became increasingly marginal, I set out to explore the possibility of an alternative career route by enrolling on a psychology-focussed PhD. Any aspirations I had of disseminating my curriculum innovation ideas beyond the immediate micro context came to a standstill largely because of this incompatibility with developments at the macro level. However, before this decision was to re-orient my career completely, the extended developmental vision I constructed during my first PhD attempt (Jess, Collins & Burwitz, 1998) not only created a more robust

case for developmental PE but also positively influenced my application for the post in Edinburgh at a politically opportune time.

Whilst the initial signs for primary PE in Scotland were no more encouraging than in England, as the new policy-making apparatus unfolded I was fortunate to witness the emergence of a developmental PE agenda at government level (HMIe, 2001, 2003; Scottish Executive, 2003, 2004a; Scottish Government, 2009; Scottish Parliament, 2009). For the first time, the key tenets of my developmental PE agenda were compatible with a national policy which enabled me to 'kick-start' the DPEP and build the momentum that has seen the project expand to its current position. It is ironic, therefore, that in the two months before presenting this thesis, I was invited to a series of meetings as a 'movement expert' to contribute to the re-working of the Key Stage One (four to seven years of age) PE curriculum in England. The outcome of these meetings has resulted in a proposal to re-orient the early years PE curriculum away from a multi-activity approach towards a more generic basic movement approach.

As such, the policy contexts in England and Scotland have both had a significant, if different, impact on my innovation efforts. In particular, the nature of the policy-making apparatus and the degree of compatibility my personal vision has had with the current policy direction has highlighted the key role the macro context can play in creating innovation climates that are either facilitating or restrictive.

Meso Contexts

The influence of the different meso level contexts on my innovation efforts has been less obvious. In part, this is because the influence of each meso level institution e.g.

local authority or university, has been mediated by the direct influence of the more immediate head teachers or department heads who, in most cases, have had considerable autonomy to manage their schools/departments. However, two unrelated meso-level issues are worthy of note in relation to my innovation efforts: innovation time and local authority managers. The amount of time available to focus on my curriculum innovation ideas has been different in the institutions in which I have worked. While innovation time was limited as a teacher, both universities have been supportive of my efforts to 'buy-out' my teaching commitment to concentrate on my innovation projects. This support over many years has been a crucial factor in creating the appropriate context in which I have been able to focus on the different curriculum, pedagogy and professional learning ideas.

Although not directly linked to my work environment, local authority managers, both in Scotland and England, emerged as important gatekeepers for and against the DPEP. While some have enthusiastically engaged with the developmental PE agenda, others have ensured the dissemination process has been slowed down or even stopped completely. This issue has become more problematic in recent years with the restructuring of Scottish local authorities which has resulted in the management of PE being subsumed within wider job remits and has led to fewer opportunities for collaborative strategic planning at the meso level. Therefore, although the influence of the meso level context on my innovation efforts is more difficult to identify, there are a number of examples where meso level influences have acted to facilitate or obstruct my innovation efforts.

Micro contexts

The impact of immediate micro environment has been more overtly intertwined with many of my personal capacities (e.g. my relationships with children, students and colleagues) and, as such, many of these micro factors will be discussed as this chapter unfolds. However, one micro level factor has been a constant feature throughout the DPEP: the marginal status of primary PE in the immediate context. While this marginalisation has generally had negative consequences, the relative autonomy this isolation presents has made a valuable contribution to the amount of freedom I have had to experiment with different innovation ideas. For example, in Fife, at the CMC at MMU and as part of the Basic Moves and 3-14 projects in Edinburgh, I have had considerable freedom to explore the curriculum, pedagogy and professional learning possibilities in each context. As such, this innovation 'space' has helped me explore many edge of chaos and collaborative possibilities within each context and develop an increasingly robust platform to initiate and sustain many of the DPEP activities.

Section Summary

From this short synthesis, it is apparent that the different contexts in which I have worked over the last 24 years have all impacted upon the nature of my innovation efforts in different ways. Although the marginal status of primary PE has been a constant, the more compatible my personal vision has been with the national policy context, the easier it has been to connect my innovation efforts across the different nested layers of the system. However, at the local level, the availability of innovation time, supported by management, has been a key factor in 'freeing' me up

to focus on my curriculum innovation and dissemination efforts. Therefore, in their own ways, each of the nested levels of the education system has influenced the nature, and extent, of my curriculum innovation efforts.

7.3 The Influence of Capacities on My Innovation Efforts

While the previous section demonstrates that contextual factors have had a significant impact on my innovation efforts, the CEA proposes that, as a complex, self-organising system, my personal capacities are likely to have had a more significant influence on my innovation efforts. Subsequently, this section considers the extent to which directional and integrating capacities have impacted on my innovation efforts (refer to Figure 3.7 on page 79).

Directional Capacities

My Evolving Vision for Developmental PE

With my original vision for developmental PE emerging as a reaction to the traditional multi-activity 'block' approach to PE, I was initially confident that the developmentally appropriate and inclusive vision I had adopted would adequately address the problems with this traditional approach (Gallahue, 1987; Jess, 1990). However, as my aspirations for the DPEP expanded beyond the immediate context and the narrow five to seven age range, this original vision was unable to cope with the more complex curriculum, pedagogy and professional learning issues that emerged as the project progressed. Consequently, the evolving nature of my vision

has been captured in four related, but increasingly more inclusive and all-embracing visions, that have helped focus my innovation efforts (see Figure 7.1).

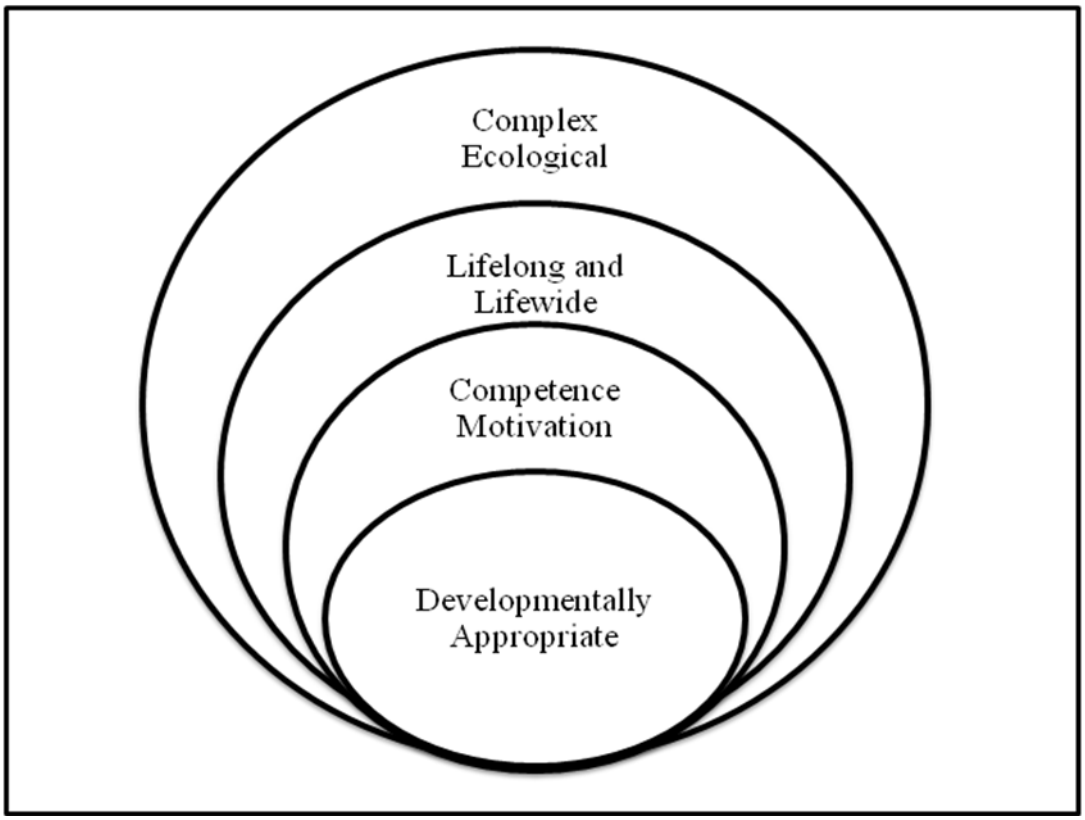

Figure 7.1 The Expanding Nature of the DPEP Vision

The first three visions specifically focussed on the individual within the developmental PE context. The original developmentally appropriate vision for young children (Jess, 1990) was first extended to focus on a multi-factorial competence motivation vision covering the childhood and adolescent years (Welk, 1999; Jess & Collins, 2003) and later to a more extensive lifelong and lifewide vision (Penney & Jess, 2004; Jess, 2004). However, while these developmental visions helped create a robust justification for my developmental PE aspirations, they were unable to help me address the more complex curriculum, pedagogical and professional learning developments as they extended across the 3-14 age range.

Following a difficult and frustrating re-orienting process, I was gradually able to extend the developmental vision by connecting with principles from ecological (Newell, 1986), dynamical systems (Thelen & Smith, 1994), social constructivist (Vygotsky, 1978), situated learning (Lave & Wenger, 1991) and complexity (Davis & Samura, 2006) perspectives. Consequently, while complexity-oriented ideas appear a logical proposition (Biesta, 2010), for the last four years the DPEG has been slowly making efforts to apply these principles in the curriculum, pedagogy and professional learning efforts that will be discussed at the end of the chapter (Jess, 2011; Jess et al., 2011; Atencio et al., in press; Thorburn et al., in press). As such, my vision not only remains an evolving work-in-process but has consistently set the parameters that frame the specific nature of my DPEP.

Emotions, Inquiry and Reflection

In most of the educational change literature, inquiry and reflection processes have been acknowledged as key capacities to help teachers cope with and influence the change process (Fullan, 1991; Schon, 1984). Throughout the DPEP chapters, inquiry and reflection have been critical to the development of my other CEA capacities and have also supported the self-organising of my innovation efforts over many years e.g. the evolving nature of my curriculum and pedagogy efforts or the different approaches to professional learning activities.

Alongside inquiry and reflection, the stability of my emotions has been a critical feature in my long-term ability to initiate, sustain, adapt and extend my innovation efforts across the DPEP. In particular, following my de-motivated and depressed state in the late 1980s, my DPEP narrative highlights how, despite periods of

isolation and frequent failure, my focus on developmental PE has helped me remain task-oriented and resilient while sustaining my motivation and confidence. For example, during my original efforts to get papers published between 1995 and 2003, all my attempts were rejected by a series of academic and professional journals. Also, in the mid-2000s, various local authority managers and primary PE specialists rejected Basic Moves and blocked its introduction into numerous local authorities. Although these experiences were emotionally painful and frustrating, my task-oriented focus helped me cope with these failures and demonstrate increasing levels of adaptability and creativity to re-focus and re-orient my innovation expectations. Acknowledging and understanding the role emotions have played in my innovation efforts continues to be both an empowering and motivating tool.

Therefore, in line with much of the 'change knowledge' discussed in Chapter 2, the evidence from my DPEP experiences would suggest that these directional capacities have played an iterative role in sustaining and adapting both the focus and trajectory of my curriculum innovation efforts. It is likely, however, that had I had a better understanding of the nature and importance of these process-oriented capacities earlier in the DPEP that my innovation efforts would have been less 'pot luck' and possibly more effective.

Integrating Capacities

Supported by these directional capacities, the CEA also proposes that integrating capacities have been the key to sustaining the conceptual and applied coherence of my innovation efforts. As such, this section considers the extent to which my evolving knowledge base and relationships have influenced these efforts.

Knowledge

From a limited starting point in 1987, my ever-changing knowledge base has been a key tool connecting my personal vision with my innovation efforts. As I have worked to articulate each successive personal vision, I have made concurrent efforts to build an appropriate knowledge base to inform my different innovation activities. Accordingly, my knowledge has developed from its original narrow focus on children's motor development and early years developmental PE (Jess, 1990) to now include a wide range of developmental, curriculum, pedagogy and professional concepts that integrate with a wider range of topics across and beyond the PE subject area. As this knowledge base has expanded and deepened, I have increasingly been in a position to collaborate with colleagues to write academic and professional papers on topics connected to the DPEP. These papers include, for example, children and young people's social and emotional development (Jess & Collins, 2003), the pre-school (Jess & MacIntyre, 2009) and upper primary PE curriculum (Jess, Haydn-Davis & Pickup, 2007), pre-school play (McEvilly et al., under review), pedagogy (Jess, 2011), lifelong learning and lifelong physical activity (Penney & Jess, 2004), professional learning (Atencio et al., in press), educational policy (Thorburn et al., 2009) and complex educational change (Jess et al., 2011). Critically, as this knowledge base has developed and expanded, my confidence to explore and integrate different curriculum, pedagogical and professional learning efforts has also increased. Conversely, during transitional periods when I have been trying to extend my theoretical perspective, my knowledge base has trailed behind and has impacted upon my confidence and led to many 'pot luck' approaches to my innovation efforts. This lack of knowledge has been most noticeable at three specific times in the DPEP:

in the initial 1987 to 1989 period before I discovered the developmental literature, when the DPEG began to engage in ill-informed professional learning activities, and when the DPEG made its initial efforts to extend its curriculum efforts beyond Basic Moves.

Crucially, while my knowledge base has been a key integrating feature of the DPEP, it has not remained as a static or specific set of knowledges. The emergent nature of this knowledge base has been central to the connections between the different personal visions and innovation efforts and also to my confidence to explore different edge of chaos innovation possibilities. However, as just discussed, when my knowledge has been lacking, it has affected both my confidence and my ability to internally integrate my thinking or externally connect with the broader educational landscape.

Relationships

It is only recently, as the DPEG's curriculum innovation efforts have disseminated to a wider professional audience, that I have realised how important the nature of internal, lateral and nested relationships has been to the progress of the DPEP. Following the isolated and small scale developments of the foundation phase, the relative success of the Basic Moves professional learning courses between 2003 and 2005 not only fuelled my motivation to extend the project, but soon highlighted the challenges of the different relationships that emerged as a result of these courses. This period became particularly chaotic as the DPEG struggled to cope with the increased number of different relationships across the nested levels of the system, e.g. class teachers, active schools coordinators, primary PE specialists, early years

educators, local authority managers, government officials and academics. In retrospect, with limited capacity, it was fortunate that government funding was made available for the PgCert in 3-14 PE as this 'forced' the DPEG to refocus its attention on the masters-level programme and slowed the pace of the dissemination process appreciably. The group now had the opportunity to reflect on the nature of the internal, lateral and nested relationships that had supported or obstructed the DPEG's initial innovation efforts.

From a personal perspective, three key relationship themes emerged as particularly influential to the future of the DPEP: participative pedagogy, 'indigenous experts' and engagement with the macro context. From early in the DPEP, my engagement with more participative teaching approaches (Gallahue, 1987) had impacted on the nature of the relationships I developed with children, students and staff as I shifted from a more top-down behaviourist approach to a more engaging (Jess, 2004) and latterly complexity-oriented pedagogy (Jess et al. 2011). However, while I started using this more participatory approach with children, students and direct work colleagues, it took much longer to connect this type of pedagogy to the relationships I developed with professional colleagues 'in the field'. Until recently, these professional relationships have generally been ill-informed and have often resulted in an uncomfortable mixture of participative and top-down episodes. While the development of the DPEG has mostly been a collaborative endeavour, many of the early professional learning activities were more top-down and linear (Atencio et al., in press). However, following my engagement with complexity-oriented theories, the professional learning literature and the teachers enrolled on the PgCert, I have increasingly been able to refocus my professional learning efforts to be more

engaging, situated and collaborative in response to the different backgrounds and contexts of the teachers. Engagement with this more participative professional learning approach is beginning to have a significant impact on how the DPEG views relationships in different contexts and, as we move into the third phase of SPPEP funding for the 3-14 programme, the importance of setting up local teacher networks and supporting teachers' distributed leadership roles has become a key objective.

However, as my understanding of, and engagement with, this more participative pedagogy became more central to my professional learning work, two further issues emerged: lateral relationships with PE specialists (i.e. the 'indigenous experts') and nested relationships at the macro level. While my experiences suggest that some primary PE specialists are unlikely to engage with Basic Moves, the traditional 'fill the empty vessel' approach we took in the early stages of the DPEP unwittingly alienated a significant number of potential allies (Atencio et al., in press). In retrospect, although it would have been more time-consuming and 'edgy', our dissemination agenda would have been much better served by employing a more participative approach with PE colleagues, particularly as many had the potential to become local advocates for our work. This could, and should, have been an important lateral capacity building exercise as it would have created a more collaborative and more robust platform from which to disseminate our developmental agenda.

Nested relationships at the macro level have also become an important consideration in the on-going development and dissemination of the developmental PE agenda. While I had little contact with colleagues at the meso or macro levels during the foundation phase, I have become acutely aware that decisions made at the different

nested levels have had a significant impact on my innovation efforts. For example, the centrally-driven, top-down and traditional multi activity approach in England during the 1990s excluded me from any macro level discussions and restricted any opportunity to move the developmental PE agenda beyond the immediate environment. Conversely, in Scotland, I have been fortunate to develop relationships with a number of key stakeholders and decision-makers who have not only enabled me to engage in national projects, e.g. the PE Review Group, but also set up the opportunity to articulate and advocate the case for developmental PE. Without these macro level relationships the opportunity to bid for the external funding that sustains the development of the DPEP would be much less likely. However, these macro level meetings/relationships are often time-constrained and more ego-oriented events which often result in transient and potentially stressful relationships. As such, although this participative approach may have been successful with colleagues who are 'on board', the challenge has increasingly been to work out how to engage with less supportive colleagues across the nested levels of the system. Nevertheless, my engagement with complexity-oriented principles has helped me understand the importance of developing more collaborative and participative relationships across all levels of the education system.

Section Summary

Although directional and integrated capacities are a recent addition to the CEA, this retrospective analysis suggests they may be a useful way to conceptually connect the different 'change knowledge' factors discussed in Chapter 2. In an applied sense, the evidence presented in my personal narrative would suggest that, although inconsistent, developing these capacities over a period of time has been a key factor

in initiating, sustaining, extending, adapting and connecting my different innovation efforts. However, there is also some frustration that my lack of this 'change knowledge', and associated inability to employ this knowledge in an integrated manner, has resulted in many rudimentary errors, particularly regarding relationships with colleagues across the different nested levels of the system.

7.4 The Complex Nature of My Innovation Efforts

In relation to the third question posed at the beginning of the chapter, this section discusses the evidence in support of the proposal that my curriculum, pedagogy and professional learning innovation efforts over the lifespan of the DPEP can be considered as complex. Specifically, consideration will be given to the evidence supporting two related issues: the complexity of the innovation process and the complex nature of the actual innovation efforts. These topics will be discussed under two headings as follows:

1. The Non-linear, Emergent and Ambiguously Bounded Nature of the Innovation Process
2. Curriculum, Pedagogy & Professional learning as Complex Innovations

As note earlier, the chapter will be concluded by presenting the current state of the DPEG's complexity-informed curriculum, pedagogy and professional learning innovation efforts.

1. The Non-linear, Emergent and Ambiguously Bounded Nature of the Innovation Process

To demonstrate the non-linear and emergent nature of my developmental PE innovation efforts, this section employs a dynamical systems approach to present the different trajectories of my curriculum, pedagogy, professional learning and overall innovation efforts. Dynamical systems, like complexity theory, supports the view that system parts interact to self-organise (Thelen, 1998) and evolve over time as the different parts change at different times and at different rates to impact on the functioning of the system (Haywood & Getchell, 2009). Subsequently, a key dynamical systems concept is the notion that different parts of the system are 'rate limiters' that hold back or help accelerate the emergence of different behaviours because they develop at different times and at different rates (Thelen, 1998). As each part of the system evolves (e.g. contexts and capacities), the overall system moves forward, stands still or regresses depending on the importance or impact of the different 'rate limiters' e.g. in children's movement development, strength is a key 'rate limiter' because until it reaches a specific level, certain movements are not possible. When it reaches this level, progress is rapid. As such, while context plays a significant role in the nature of the systems evolving trajectory it is ultimately the self-organising nature of the system that adapts to create the resultant pathway.

To represent the trajectory of my overall innovation efforts (see Table 7.1), three sets of graphs and tables track the pathway of my evolving efforts over the 24 years of the DPEP. The first two sets of graphs and tables represent the trajectories of the DPEP curriculum and pedagogy efforts (Table 7.2 & Figure 7.2) and the DPEP

professional learning efforts (Table 7.3 & Figure 7.3). The third graph is a synthesis of these two discrete pathways and represents the overall DPEP innovation pathway as a dynamical system (Figure 7.4). It is important to stress that each graph has been created to offer a general representation of the impact of key rate limiters on the pathway for each innovation activity and is not a precise depiction based on specific quantitative data. Accordingly, the trajectories pinpointed are based on the key DPEP milestones and 'rate limiters' that set up change (see Tables 7.1, 7.2 and 7.3). In each graph, the x-axis represents specific years of the DPEP and the y-axis depicts the periods of progress, stability or regression of the innovation efforts across certain years.

Table 7.1 Key Positive Milestones of the DPEP

Foundation Phase		**Delivery Phase**	
1987	• Initial conditions	**2001**	• Basic Moves & DPEG Commences
1989	• DPEP commences	**2004**	• Basic Moves National Training
1991	• Move to England & Higher Education	**2006**	• Extend to 3-14 curriculum focus & Introduce PgCert in 3-14 PE
1993	• Develop Child Movement Centre	**2008**	• PgCert in 3-14 PE: Phase 2
1997	• Begin First PhD Attempt	**2011**	• PgCert in 3-14 PE: Phase 3
1999	• Move to Scotland		

Overall, each graph highlights an upward trend for the project, particularly when it moved into the delivery phase in 2001. However, each trajectory also contains a number of key 'bifurcation' (Prigogine, 1997) points, which represent a self-organised deviation, positive or negative, from the linear pathway. As will be discussed, there are three particularly noticeable 'bifurcation' points: progress in 1989 following the initial period of non-activity, the drops in curriculum activity between 1991 and 1993, 1997 and 2001 and 2004 and 2007 and the significant rise in professional learning activity from 2001 onwards. Consequently, each trajectory highlights the non-linear and self-organising nature of both my overall and discrete developmental PE innovation efforts.

Table 7.2 Key Milestones of the Curriculum & Pedagogy Innovation Pathway 1987-2011

	Curriculum & pedagogy	Other
1987	• No activity	
1989	• Exploratory early years developmental PE programme	
1991	• Undergraduate motor evelopment and developmental PE Courses	To England
1993	• Create Child Movement Centre (CMC) and introduce CMC clubs	
1997	• Continue CMC but move away from PE and cease curriculum and pedagogy study	
1999	• No practical delivery except undergraduate secondary PE students	Return to Scotland
2001	• Introduce Basic Moves school and community classes	B Moves Funding
2004	• Consolidate Basic Moves curriculum and pedagogy	
2006	• Grapple with pre-school and UPES curriculum beyond Basic Moves	Scot Exec Funding
2008	• 3-14 complexity-oriented curriculum and pedagogy developments	
2011	• DPEG staff specialising in specific 3-14 curriculum projects (e.g. Early Moves, Outdoor Journeys, Dance Education)	Scot Govt Funding

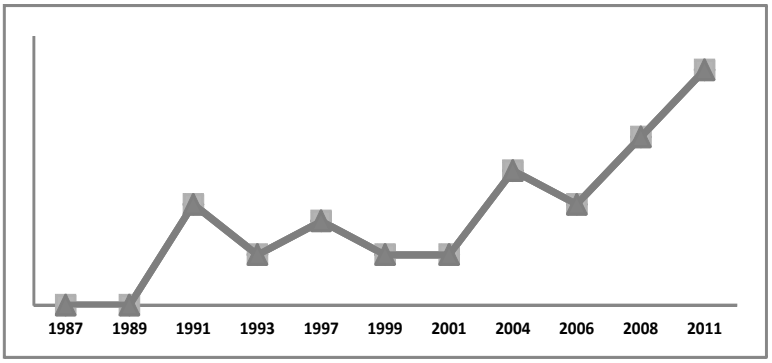

Figure 7.2 The DPEP Curriculum and Pedagogy Innovation Pathway

Based on the key 'rate limiters' (Table 7.2), the DPEP curriculum and pedagogy innovation pathway (Figure 7.2) reveals an inconsistent trajectory. For example, the non-linear trajectory of the foundation phase is demonstrated by a pathway beginning with a two year period of non-activity, followed by two years of concerted curriculum and pedagogy innovation in Fife primary schools because the initial 'rate limiters', lack of motivation and knowledge, were concurrently addressed. This was followed by a relatively fallow two year period when I moved to England and spent an introductory period in higher education before setting up the Child Movement Centre in 1993 and another surge in curriculum and pedagogy activity. However, largely because of the macro policy context, I made the conscious decision by 1997 to move away from my curriculum and pedagogy efforts to concentrate on my psychology-focussed PhD. This downward trend was then interrupted by my move to Scotland in 1999, which set up the acquisition of Basic Moves funding in 2001, ignited the delivery phase of the DPEP and rekindled the upward trend of my curriculum and pedagogy efforts. Since then, my curriculum and pedagogy efforts have extended to cover the 3-14 age range, although there was another 'rate limiting' setback between 2004 and 2007 when I was attempting to realign my developmental vision with complexity-oriented theory. Recently, as will be discussed later, the DPEG's curriculum and pedagogy innovation efforts have consolidated around specific early years and UPES developments and discussions are currently taking place to consider developments in the senior secondary years.

Table 7.3 Key Milestones of the Professional Learning Innovation Pathway 1987 to 2011

	Professional Learning Activities	Other
1987	• No activity	
1989	• Work superficially with class teachers	
1991	• None	To England
1993	• Sporadic CPD days and half days	
1997	• Sporadic CPD days and half days	
1999	• No CPD, but various professional presentations	Return to Scotland
2001	• Pilot numerous Basic Moves CPD activities: top-down & collaborative	Basic Moves Funding
2004	• Introduce Basic Moves National Training across Scotland and England	
2006	• Basic Moves tutor and introduce Postgraduate 3-14 Programme	Scot Exec Funding
2008	• Basic Moves learning Communities • Extend range of PE-CPD to cover 3-14 age range and introduce 3-14 tutor programme • Postgraduate Programme (3-14) continues	
2011	• Introduce national CPD summer school • 3-14 Postgraduate Programme numbers exceed 400 teachers and 3-14 key underpinning feature of B.Ed. (Physical Education)	Scot Govt Funding

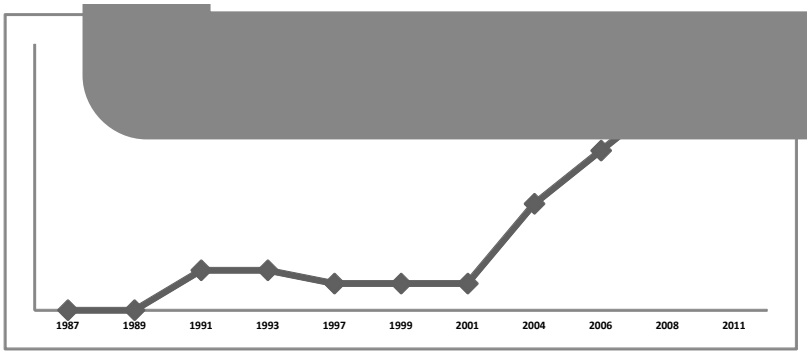

Figure 7.3 The DPEP Professional Learning Innovation Pathway

While curriculum and pedagogy have been a constant throughout my innovation efforts, it was not until the early stages of the delivery phase that professional learning emerged as a key feature of the DPEP (see Table 7.3). Although I was involved with primary teachers in Fife and undergraduate students at MMU, and delivered a small number of CPD courses, my engagement with professional learning activities during the foundation phase was low key as the macro policy context again acted as a key 'rate limiter'. However, from the start of the delivery phase in 2001, the DPEG's engagement with professional learning activities has grown year on year. Although there have been a number of problem periods, this delivery phase has been characterised by a series of increasingly more detailed and wider reaching professional activites that include the Basic Moves pilot courses, the Basic Moves National Training and Tutor Programme and the PgCert in 3-14 PE. Subsequently, following a long period with limited professional learning activity, the last decade has seen the DPEG involved in professional learning activities that have engaged thousands of teachers and physical activity professionals across Scotland and the rest of the UK.

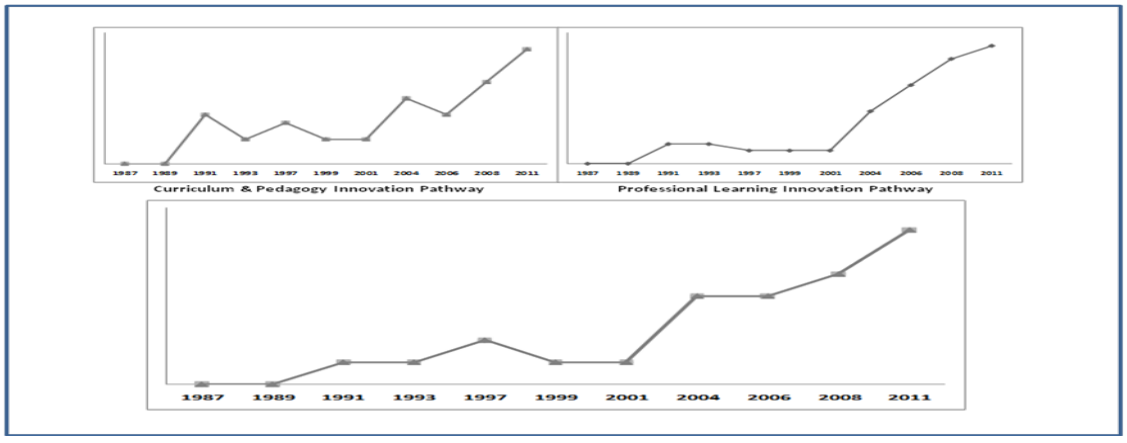

Figure 7.4 An Overview of the Developmental Physical Education Project Innovation Pathway

From a dynamical system perspective, the overall DPEP innovation pathway is presented as an amalgam of the curriculum, pedagogy and professional learning graphs (Figure 7.4). Consequently, the graph highlights how the innovation pathway, from an initial two year period of almost no innovation activity, generally moves in an upward direction, with the main exception being the 1997 to 2001 period, when my initial PhD studies acted as the main 'rate limiter' before my first two years in Edinburgh acted as a regrouping period. Even although there have been dips in my curriculum and pedagogy inovation efforts during the mid-2000s, the significant upturn in dissemination through professional learning activities has resulted in the overall trajectory of the delivery phase being in an upward direction.

However, while the innovation pathway graphs represent the non-linear nature of my innovation efforts, they are unable to capture the changing 'shape' of these efforts. This idea of the 'shape' is important because it considers how, over time, these efforts have neither been narrow and pre-programmed with certain outcomes nor 'anything goes', open and completely chaotic. The CEA proposes that different contextual factors and capacities 'shape' my innovation efforts by creating the parameters that bound them. Accordingly, as key contextual factors and capacities change the 'shape' of the efforts, the innovation efforts become ambiguously bounded. For example, Table 7.4 highlights how my personal vision and contextual factors have evolved over four time periods to influence the changing 'shape' of my curriculum innovation efforts from a narrower basic movement foundation for 5-7 years olds to a wider ranging core learning and application focus across the 3-14 age range.

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Table 7.4 Contextual Factors, Personal Vision and DPEP Curriculum Innovation Efforts

	Contextual Factors			**Personal Vision**	**DPEP Curriculum Innovation Efforts**
	National Policy	**National Primary PE Framework**	**Meso and Local Context**	**Developmental PE Vision**	
1987-1991	Scottish policy context at odds with Conservatives in London	PE as an Expressive Art Multi-activity and Movement Education	Fife Guidelines but freedom to experiment	Developmental appropriateness	**Fundamental movements, movement concepts** **Engaging pedagogy**
1992-1999	Neo-liberal, restorationist and top-down policy landscape in England	English PE National Curriculum focussed on multi-activity PE curriculum	English schools constrained but university supportive of innovation	Developmental appropriateness	
1999-2005	Emerging participative and egalitarian policy landscape	1992 Scottish 5-14 Guidelines Multi-activity and Movement Education within Expressive Arts	More freedom in schools, workplace autonomy but secondary multi-activity focus	Competence motivation and lifelong learning perspective	**Basic Moves for 5-7 year olds** **Engaging Pedagogy**
2005-2011	Lifelong learning and inclusive goals	PE, Physical Activity and Sport (PEPAS) within Health and Well Being as part of CfE	Teachers have much more freedom to develop primary PE curriculum	Complexity theory & social constructivism	**3-14 core learning and applications** **Emergent and collaborative pedagogy**

Section Summary

This short section has presented a general representation of my innovation efforts across the foundation and delivery phases. The graphs not only reveal how the trajectory of these efforts has been inconsistent with many 'bifurcation' and 'rate limited' points, but also reveals how the more collaborative delivery phase, even with its difficult periods, has moved the project in a consistently upward direction. Currently, however, although finances are in place for the 2011-12 academic session, the uncertainty of future funding sources highlights the non-linear nature of the long term innovation process.

2. Curriculum, Pedagogy and Professional Learning as Complex Innovations

This section retrospecively discusses the extent to which the DPEP's innovation efforts could be described as complex by considering how my curriculum, pedagogy and professional learning efforts could be seen as self organising and emergent, ambiguously bounded and edge of chaos and connected and nested. The section will finish by presenting the DPEG's most recent complexity-informed curriculum, pedagogy and professional learning innovation efforts.

Self-organising and Emergent

Although I have only consciously viewed my innovation efforts from a self-organising perspective since 2007, I am aware that many aspects of my earlier innovation efforts were unwittingly based on notions of self-organisation. Whilst discovering Gallahue's developmental approach to early years PE (Gallahue et al., 1975) was the 'aha' moment, my engagement with self-organisation and emergence

has been a more gradual and 'messy' process. It has, however, been my recent understanding of complex systems as self-organising phenomena that has helped me engage with a developmental PE project that now feels more manageable, integrated and logical. As such, to recap Chapter Three, the evolving nature of the CEA has been based on the following four key proposals related to self-organisation:

1. The learning process is a 'natural' self-organising phenomenon that produces emergent and unpredictable behaviours, and not pre-programmed outcomes with a degree of certainty.
2. By itself, self-organisation does not necessarily lead to desirable or appropriate outcomes.
3. From a learning perspective, self-organisation is best when occurring in a social context, preferably under guidance.
4. Guidance is best when focussed on the support of self-organising learning, although there are times when a more top-down, linear and content specific teaching approach may be appropriate.

This next section will consider the extent to which these notions of self-organisation and emergence have been incorporated into my curriculum, pedagogy and professional learning innovation efforts.

Curriculum and Pedagogy as Self-Organising and Emergent

As noted earlier, as with many other contemporary PE curriculum innovations, my original curriculum innovation efforts were a reaction to a perceived flaw in the dominant contemporary curriculum rather than a theoretically-driven initiative (Ely,

1999). Consequently, although this early years curriculum effort was informed by developmentally appropriate, competence motivation and lifelong learning perspectives, it was not until I specifically engaged with notions of self-organisation that I was able to effectively extend my developmental vision across the 3-14 age range and connect with an expanding range of professional learning activities. This change in perspective took many years as I struggled to find a way to 'harmonise' (Davis & Sumara, 2006) the traditional approach to movement skill development based on the transmission of specific criteria with the more open-ended notions of adaptability and creativity (Jess et al., 2004). Much of this tension stemmed from my original years as a secondary PE teacher (1978 to 1987) when my teaching had focussed on the technical development of specific sport skills. These narrow teaching experiences were followed by the early years developmental PE period from 1989 until 2006 which sustained my focus on the 'set in stone' criteria for 'mature' basic movements (Gallahue, 1987) but increasingly included movement concepts to support notions of adaptability and creativity (Jess, 1990). As such, this mixture of the technical, adaptable and creative (TAC) was to become a key, but uncomfortable, feature of Basic Moves as the DPEG developed the TAC task triangle (Figure 7.5) and used it as a key component of the national training programme (Jess, 2004).

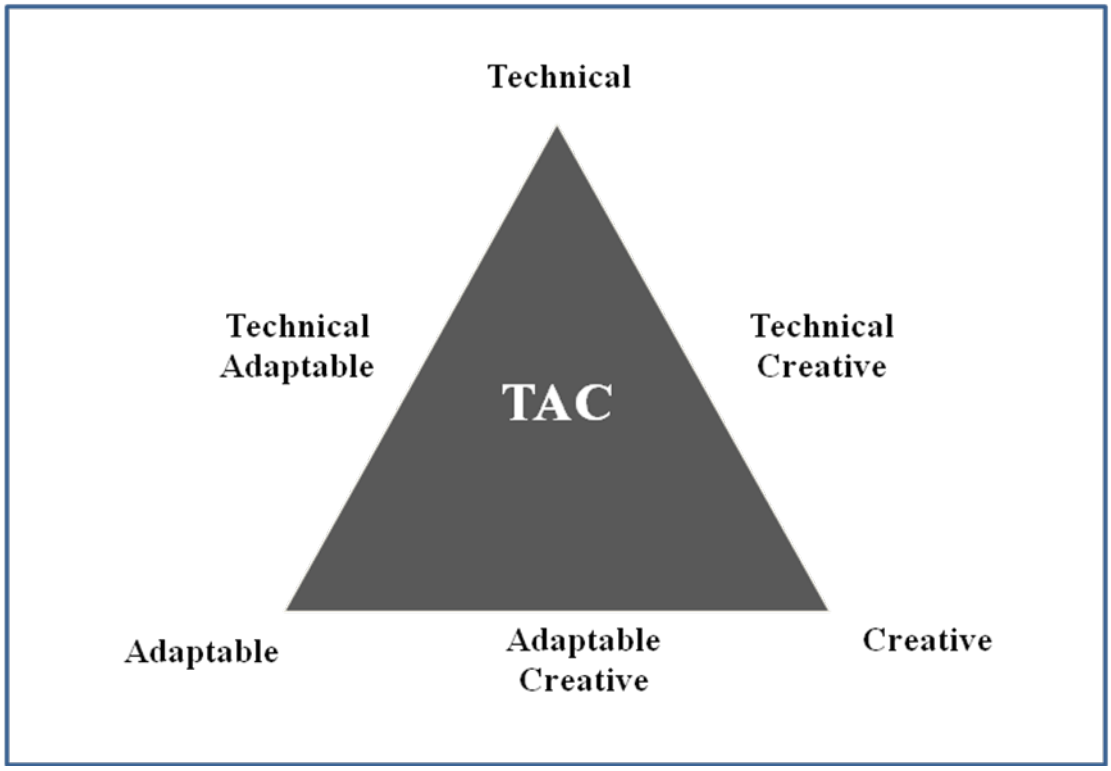

Figure 7.5 Developing Learning Experiences: The TAC Task Triangle (from Jess, 2004)

Although this TAC framework effectively incorporated the potential range of basic movement outcomes, class teachers tended to privilege the technical criteria at the expense of the adaptable and, particularly, the creative. Consequently, as the DPEG began to extend beyond Basic Moves to the pre-school and UPES age groups, problems began to emerge. For the two and three year olds, 'mature' basic movement criteria were generally far beyond their developmental capabilities, whereas many of the complex activities experienced by the older children involved a much wider and more sophisticated range of psychomotor, cognitive, social and emotional skills. While Basic Moves was able to accommodate this technical, adaptable and creative approach, it was unclear how this frame of reference would articulate with the less developed abilities of younger children and the more complex

contexts in which older children engaged. As discussed earlier, this dilemma raised significant theoretical problems in the mid 2000s and resulted in many of our extended curriculum and pedagogy efforts stalling. In dynamical systems terms, this lack of theoretical clarity was a key 'rate limiter'.

Following many edgy and frustrating discussions and pedagogy experiments over a period of time, our curriculum and pedagogy ideas slowly began to take shape. With a DPEG early years group focussing on the ecological and dynamical systems literature (Newell, 1986; Thelen, 1995), and an UPES team focussed on more situated and 'authentic' perspectives (Lave & Wenger, 1991; Kirk & Kinchin, 2003; Rovegno, 2006), the addition of self-organisation and emergence acted as a unifying catalyst. The DPEG began to reconfigure its 3-14 curriculum and pedagogy efforts along the lines of self-organising emergence and uncertainty (Jess et al., 2011). Further, by acknowledging learning outcomes as ambiguously bounded, we conceded that curriculum content needed to be flexible to accommodate behaviours and practices that are non-linear and on-going. From a Basic Moves perspective, although the specific 'mature' movement criteria remained as useful knowledge for teachers, in most cases, these were no longer the focus of the learning experiences. We began to realise that a specific 'mature' performance would only occasionally be the outcome, as learners would respond differently in different contexts and at different times: there was 'best fit' as opposed to 'one way' of doing things. We began to see learners as self-organisers who were adaptive and creative in their emergent behaviour, while retaining a degree of technical consistency. For younger children, we recognised that the ability to be adaptable and creative was a more

important foundation because younger children were usually not 'ready' to engage with specific technical criteria. Pre-School Early Moves emerged as learning experiences focussed on a more generic movement underpinning that would feed into the more technically-oriented Basic Moves (Jess & McIntyre, 2009). For older children, our curriculum ideas began to focus on the self-organising psychomotor, cognitive, social and emotional core learning that would develop from Basic Moves and connect to the more complex, situated, collaborative and open-ended learning experiences we termed authentic applications (Jess et al., 2007) [e.g. sport education (Siedentop, 1994); Outdoor Journey (Beames & Atencio, 2008; Dance Education (Irvine, 2009)]. We are still exploring the best way to structure the relationship between core and applied learning (Thorburn et al., 2009) and how to articulate these developments with the notions of lifelong learning discussed earlier (Penney & Jess, 2004) .

Critically, our recent complexity thinking has us now viewing curriculum through a self-organising lens as experiences that lead to non-linear learning pathways. Complex curriculum and pedagogy acknowledge and focus on children as complex learners that are not 'one size fits all', but self-organising phenomena that are ambiguously bounded and operate at the edge of chaos. Change and unpredictability are considered integral elements of children's learning behaviours and practices. This issue is now at the forefront of our work with colleagues around Scotland and, as we move into the third phase of the 3-14 project, we are seeking to help teachers build those capacities that will help them confidently engage with complex learning experiences.

Professional Learning as Self-Organising and Emergent

In 2002, when the dissemination of Basic Moves began, I had limited understanding about, or experience of, professional learning and many of our early activities mirrored off-site, top-down traditional CPD programmes (Duncombe & Armour, 2004). From a dissemination and entrepreneurial perspective, the initial success of Basic Moves was highlighted by the overwhelmingly positive responses from the majority of the 500 delegates attending these events (Jess, 2006b). However, as has been discussed elsewhere, the drawbacks of this linear CPD approach were soon highlighted as the DPEG did not have the capacity to support delegates in their own contexts or to respond to numerous unimpressed primary PE specialists who acted as gatekeepers in their schools and local authorities to block the dissemination of Basic Moves. While the introduction of the Basic Moves tutor programme in late 2005 (Jess, 2005) went some way to ameliorate these problems by creating a small network of tutors to deliver and support Basic Moves in their own communities, most tutors were either employed as traditional top-down course presenters or did not deliver any Basic Moves courses. Therefore, while Basic Moves was successful on some levels, the issues inherent in traditional top-down CPD highlighted the need for a different approach to help us more effectively disseminate our curriculum innovations.

Gradually, from 2007 onwards, as the DPEG engaged with more complexity-oriented theories, the notions of self-organisation and emergence began to influence our innovation efforts and we began to draw clear connections between our more complex curriculum and pedagogy efforts and our professional learning activities. Accordingly, the DPEG's recent professional learning activities now seek to build on

the contemporary literature that suggests CPD is best when it is active, reflective, on-going and collaborative by additionally proposing that CPD should be viewed as a self-organising, situated, supported and emergent process. As already noted, this does not mean an 'anything goes' approach, but one that is ambiguously bounded by national and local guidance and involved an iterative process of reflection, negotiation and collaboration. For example, the PgCert in 3-14 PE has enabled the DPEG to take a longer term view of professional learning from this self-organising perspective and acknowledge and encourage an innovation process that follows different trajectories for teachers in different contexts.

We now engage in more participative professional learning that encourages teachers to adopt leadership roles in their schools and communities with the result that we are able to identify how the developmental PE curriculum is taking on self-organising trajectories in different settings (e.g. Wood & Jess, 2009; Begg & Watson, 2010; Hutt, 2011; Jess et al., in press). By encouraging 3-14 teachers to take on leadership roles, we are advocating that primary PE learning communities will evolve and, in time, come to produce new and rich behaviours, knowledges and practices (Morrison, 2008) that reflect contemporary innovation agendas. We suggest that a self-organising, collaborative and open-ended approach that acknowledges and provides for the non-linear and unpredictable nature of professional learning is an essential feature of our innovation agenda. This self-organising view of professional learning signals how we have shifted away from traditional PE CPD models that are '*imbued with order and fixed certainty*' (Rayner, 2008, p. 42), and treat participants as 'empty' vessels (Morrison, 2008, p. 25) who need to be 'filled' by the linear transmission of set knowledges and practices. Consequently, the next crucial step is

to set up robust networking mechanisms that will not only help the DPEG support to 3-14 teachers[14] in schools in a nested fashion, but will encourage them to develop and maintain lateral contacts with colleagues working in similar contexts.

Section Summary

This section has highlighted how my recent engagement with self-organisation and emergence has acted as the catalyst for changes to the DPEG's curriculum, pedagogy and professional learning innovation efforts. Viewing learning as a self-organising process has helped shift my thinking beyond the constraints of traditional top-down certainty to engage with curriculum and professional learning in ways that are more participative and unpredictable, but, as will now be discussed, within ambiguous boundaries. This new way of thinking has not only helped extend and connect our curriculum innovations across the 3-14 age range but has helped us create a collaborative and situated approach to the professional learning activities that disseminate our curriculum innovations beyond the immediate environment.

Ambiguous Bounding and the Edge of Chaos

The CEA proposes that self-organising innovation efforts do not take place within a fixed or 'anything goes' context but are ambiguously bounded. For example, if the age range of the curriculum innovation, the nature of the national policy regulation and my pedagogy are considered as key variables, the parameters of the innovation efforts will be bound in different ways. A curriculum innovation focussed on a narrow age range (e.g. Ten year olds), combined with very specific and rigorously monitored national policies, and delivered by strict behaviourist pedagogy is likely to

[14] 3-14 teachers are students, or have completed, the PgCert in 3-14 PE

create an innovation 'shape' that is both thin and tightly constrained or bounded. However, this 'shape' changes quite markedly if the age range is increased (e.g. ages 3-18), the national regulations are relaxed and I employ a more participative pedagogy. Not only would this innovation 'shape' be broader (age) and more flexible (policy), there would be more opportunity to explore the different edge of chaos possibilities within these wider parameters (pedagogy). Subsequently, while the first example highlights an innovation 'shape' that is narrow (age), tightly bound (policy) and offers limited edge of chaos experimentation (pedagogy), the second example presents a 'shape' that is more ambiguously bound and, consequently, facilitates more edge of chaos experimentation. The following two examples explore the extent to which my curriculum and pedagogy and then my professional learning activities have been ambiguously bounded over the 24 years.

Ambiguously Bounded Curriculum Innovation Efforts

From a curriculum perspective, the on-going interaction between the different contexts in which I worked and my different visions of developmental PE highlight the ambiguously bounded nature of the DPEP innovation efforts. For example, my innovation efforts between 1989 and 1999 were narrowly focussed on an early years developmentally appropriate vision (Gallahue, 1987) which concentrated on a curriculum of fundamental movements and movement concepts for five to seven year olds and, in England, was constrained by a tightly constrained top-down policy agenda. However, for most of this period, because of the marginal status of PE in the Fife primary schools and the positive support I received from the sports science department at MMU, I was offered considerable autonomy to explore my developmentally appropriate vision, experiment with curriculum and pedagogy ideas

and push many of these ideas to the edge of chaos across the four to 11 age range. In Fife, I was able to use my classes as 'laboratory' settings for fundamental movement assessment of children across the age ranges, whilst being able to explore the pedagogical possibilities of the movement concepts, creativity, observation, guided discovery techniques and creating contexts that focussed on high levels of child engagement and decision-making. Later, in the mid 1990s at the CMC, I was able to extend these pedagogical ideas with children, students and parents. Therefore, from 1987 to 1999, these loosely bound micro contexts did not constrain or 'straight jacket' my efforts, but allowed me the opportunity to undertake the edge of chaos experimentation that helped me work out the parameters of this developmental approach and extend my ability to engage with a more participative pedagogy.

However, as has previously been highlighted, this approach put me at odds with the dominant multi-activity/movement education approach in Fife (SED, 1969) and particularly the traditional multi-activity PE model in England (DES, 1992). Because my curriculum ideas did not fit into the wider school context, my innovation efforts were solely housed within the narrow bounds of my immediate micro work context. During this first 12 year period, the narrow age focus of my curriculum innovation and the national policy and PE contexts tightly bound the 'shape' of my innovation efforts to the immediate micro context, but the relative autonomy I was given in these immediate work contexts allowed me the opportunity to experiment with my ideas and develop a more participative pedagogy.

From 2001 onwards in Scotland, however, the 'shape' of these curriculum innovation efforts slowly began to change. National developments resulted in my basic movement agenda connecting to a more contemporary approach to education

(Scottish Executive, 2004a) and PE (HMIe, 2001; Scottish Executive, 2003a; 2004b). For the first time, my developmental PE agenda was compatible with the national context, and I now saw my curriculum efforts being disseminated and experimented with beyond the micro context. The 'shape' of Basic Moves began to change as it was no longer restricted to the immediate environment.

Unfortunately, my efforts to extend curriculum innovation towards the pre-school and UPES years were initially unsuccessful because I was not equipped with the appropriate vision and knowledge base to move beyond Basic Moves. As noted earlier, 'messy' edge of chaos meetings were now common as DPEG members began to specialise in early years and UPES developments and grapple, unsuccessfully for some time, with key curriculum and pedagogy issues (Personal Diary, 2006). Engagement with complexity-oriented theories, initially Thelen's dynamical systems work (1996), Rovegno's situated perspectives (2006) and a raft of complexity theorists (e.g. Morrison, 2003; Davis & Sumara, 2006; Biesta, 2010) all gradually helped the group extend beyond Basic Moves and reshape our curriculum and innovation efforts (Jess et al., 2011). From late 2006, the parameters or boundaries of our curriculum innovation efforts broadened considerably as an early years balance and coordination grid (Jess & McIntyre, 2009) and the UPES core learning and applications approach (Penney, Jess & Thorburn, 2006; Jess, Pickup et al., 2007; Thorburn et al., 2009) resulted in members of the DPEG beginning to take more control of curriculum and pedagogy projects in line with developmental principles and more complex pedagogy (Jess & McIntyre, 2009; Beames & Atencio; 2009; Jess et al., in press). In addition, although the PE, physical activity and sport (PEPAS) learning outcomes within the Curriculum for Excellence (Scottish Government,

2009) have yet to be completely embedded in PE practice in schools, the DPEG's recent curriculum innovation efforts all appear to connect seamlessly with this macro level development. Over a reasonably short period of time, the 'shape' of the DPEG curriculum efforts has changed as the age range has been extended and a wider range of professionals continued to develop their personal vision of developmental PE in their own settings.

This section has highlighted how my original curriculum and pedagogy innovation efforts were tightly bound by a narrow age phase focus and by a national policy context that restricted the scope of the PE curriculum. However, I was fortunate to be working in micro contexts that offered me the autonomy to experiment with the edge of chaos possibilities of my developmental curriculum ideas. With my return to Scotland, the last decade has seen a reshaping of these curriculum innovation efforts as my personal vision has broadened and connected with a less controlling and more participative national policy context. These recent developments have created a curriculum 'shape' that is now more loosely bound, in that it is broader in terms of age focus, more flexible through the connections between my more complex developmental principles and the Scottish policy landscape, and evolving in different ways in many local contexts across the country. Over time, the 'shape' of my curriculum and pedagogy efforts has been ambiguously bounded as they have gradually evolved from being narrow and constrained to now being much broader and more flexible.

Ambiguously Bounded Professional Learning Innovation Efforts

The DPEP professional learning activities, as discussed earlier, represent the dissemination mechanism for the Basic Moves and 3-14 PE curriculum efforts and, as such, have only become a key feature of the DPEP during the delivery phase (see Table 7.5).

Table 7.5 The Nature of the DPEP Professional Learning Activities

	DPEP Professional Learning Activities
1987-2001	• Short monthly sessions with 100 class teachers (87-91) • Intensive work with undergraduate students (91-94) • Occasional short CPD courses (91-99) • First national conference in 1994
2001-2006	• Basic Moves Pilot, National and Tutor Training Programmes • Basic Moves Learning Communities Project • Three national conferences
2005–2011	• PgCert in 3-14 PE: over 400 teachers • 3-14 PE Tutor Programme • Many invited and organised CPD courses by DPEG • National Conference (300+ delegates) • National Primary PE-CPD including pilot Summer School in 2011

While my foundation phase curriculum and pedagogy innovation efforts remained housed within the immediate micro context, there was little professional learning activity of note. I was initially invited to carry out developmental movement courses in a number of primary schools early in my MMU tenure, but from the mid-1990s onwards, as the government pressure for their traditional sport agenda

intensified (Department of National Heritage, 1995), my professional learning invites were restricted to contexts less regulated by central government (e.g. special schools, the independent sector and dance initiatives). Consequently, during the foundation phase, there was almost no 'shape' to my professional learning activities, particularly from 1997 until 2001 when my career pathway was re-orienting away from primary PE.

However, from late 2001, professional learning activities rapidly, almost too rapidly, became a key feature of the DPEG dissemination efforts, involving an increasingly diverse range of professionals across a wide array of award-bearing and non-award-bearing activities. From no professional learning activities in 2001, the 'shape' of the DPEG's portfolio evolved to include: national conferences; short, one-off, university-based courses; school-based courses; week-long summer schools and student professional learning weeks; tutor programmes for local CPD leaders; a two year part-time masters level programme; extensive distance learning developments and Basic Moves learning communities projects.

Although successful at certain levels, the original CPD efforts were an ill-informed and erratic element of the DPEP. It was the chaotic and increasingly complex nature of these professional learning activities that was the catalyst for a reconsideration of the vision driving our developmental PE innovation efforts. With different parts of the country 'buying-in', others 'opting-out' and PE colleagues in secondary schools remaining on the margins of our efforts (Thorburn et al., 2009), our professional learning activities increasingly bore no resemblance to a simple top-down linear dissemination approach, but were more like a patchwork of success and failure, activity and non-activity, and readiness and inflexibility.

Between 2006 and 2011, the introduction of the government supported PgCert in 3-14 PE has helped reshape our professional learning activities as, for the first time, we have been able to work more intensely and regularly with many teachers over an extended period of time. We have been able to move beyond the 'fill the empty vessel' approach that too often constrained many of our early professional learning efforts. As a group, we are consciously seeking to build our own capacity to engage with a more participative approach to the professional learning process (Atencio et al., in press). In particular, with regular class meetings, assessment tasks contextualised in the teachers' personal settings and course content discussing contemporary curriculum innovation and collaborative ideas, the DPEG's professional learning activities are increasingly being bound by developmental and complex principles which are then being disseminated in many different ways into local contexts across Scotland.

Therefore, from no CPD activity in 2001, the DPEG's professional learning efforts have evolved in both a non-linear and somewhat chaotic manner. However, as the DPEG has engaged with complexity principles, the group increasingly acknowledges that the 'shape' of these professional learning activities are ambiguously bound as more and more teachers and students become involved and begin to take on dissemination and leadership roles within their own local communities.

Section Summary

As my innovation activities have evolved, they have been ambiguously bounded, particularly as the focus of the innovation efforts has broadened, articulated more closely with government policy and become a more collaborative and distributed

venture. The 'shape' of the innovation efforts has not been fixed, but has constantly changed as different contextual factors and personal capacities have influenced the development process. However, acknowledging these curriculum innovation efforts as non-linear and ambiguously bounded poses questions about the capacities needed to cope with and influence this ever-changing phenomenon.

Connected and Nested

Connectedness and nestedness, and the lack of both, have been key themes running through this and the DPEP chapters. In particular, the earlier sections exploring the integrating capacities (knowledge and relationships) have highlighted how important it has been for my innovation efforts to be connected internally, laterally and in a nested sense. For example, while my knowledge base was originally disconnected from many aspects of PE and education, as it has become framed by broader complexity-oriented principles and set within a more compatible national policy context (HMIe, 2001; Scottish Executive, 2004a), it has increasingly 'come together' to create a more innovative 3-14 PE curriculum and pedagogy that links learning within, across and beyond the school setting. Further, in terms of my relationships, the original disconnection from the dominant multi-activity curriculum model and national curriculum in England (DES, 1992), made it very difficult to develop the internal, lateral and nested relationships to extend, and disseminate, beyond the immediate micro context. However, closer connections to government policy in Scotland have not only helped create the context for more robust internal relationships (in terms of the DPEG), but have also instigated a substantial increase in opportunities for lateral and nested connections. From early feelings of isolation, these cognitive and emotional connections have gradually created feelings of

participation and belonging as my knowledge base has connected with broader educational agendas. Opportunities to engage in collaborative internal, lateral and nested professional learning projects have become more readily available. As such, whilst my original interest in developmental PE created feelings of isolation and marginalisation, there can be little doubt that any success the DPEG has had in the last decade is predicated upon the different connections that have been made across the education system. Without these relationships, the idea of Basic Moves would have remained locked in a small gymnasium in the University of Edinburgh.

7.5 Current DPEG Innovation Efforts

In an effort to synthesise how complexity thinking has influenced my work, the final section of the chapter will conclude by presenting an updated summary of the DPEG's current complex curriculum, pedagogy and professional learning efforts that are increasingly being informed by notions of self-organisation, emergence, ambiguous bounding, edge of chaos, connectedness and nestedness. The section will be presented under three headings: A Developmental PE Curriculum, Complex Pedagogy and Complex Professional Learning. This summary is an amalgam of recent ideas presented throughout the previous chapters, in various recently published papers (e.g. Atencio et al, in press; Jess, 2011; Jess, in press) and in practice by the DPEG and 3-14 teachers (Jess, Atencio & Carse, in press).

A Complex Developmental PE Curriculum

Principles Informing a Developmental PE Curriculum

The principles currently informing the DPEG's Developmental PE Curriculum are based on three key complexity-informed beliefs about learners:

1. Learners are not pre-programmed to automatically produce certain or specific (movement) outcomes
2. Learners are self-organisers who create emergent and unpredictable behaviours
3. By itself, self-organisation is neither good nor bad and does not ensure that learners engage effectively or enthusiastically in (PE) learning experiences.

Subsequently, Developmental PE is based on the belief that teachers need to create learning experiences that help children develop the self-organising skills and abilities that will, over time, enhance the development of their PE learning. As such, learning experiences in PE should be:

Participative: to actively engage children in the learning process and not treat them as 'empty vessels' to be filled

Developmentally Appropriate: to recognise children's psychomotor, cognitive, social and emotional learning

Inclusive: to provide opportunities for all children to learn and benefit from their PE experiences

Connected: to ensure the coherence of PE learning experiences within, across and beyond the school

Lifewide : to connect all children's curriculum experiences with their 'real life' experience beyond the school.

A Complex Connected Curriculum

On the basis on these five principles, the DPEG's current Developmental PE curriculum is structured around two connected elements: core learning and applications (see Table 7.6). Core Learning represents the learning experiences needed to underpin and connect all PE experiences across the 3-14 age range and beyond, while applications are the more clearly bounded contexts in which children apply their core learning in order to enhance the development of their lifelong physical activity foundation. Different applications set ambiguous boundaries in which the children apply their core learning e.g. gymnastics or games.

Table 7.6 Core Learning & Applications in 3-14 Developmental PE

Age Phase	Core Learning	Applications
Early Years	• Basic Moves & Preschool Early Moves	• Early Years Generic and Developmental Applications
UPES	• UPES Core Learning	• UPES Developmental and Authentic Applications

These two connected elements have been developed from an age phase perspective by focussing on the Early Years (3-8 years) and the Upper Primary and Early Secondary years (UPES) (8-14 years) (see Table 7.6) in order to highlight the notion of vertical progression from more simple to more complex as the children grow older (See Figure 7.6).

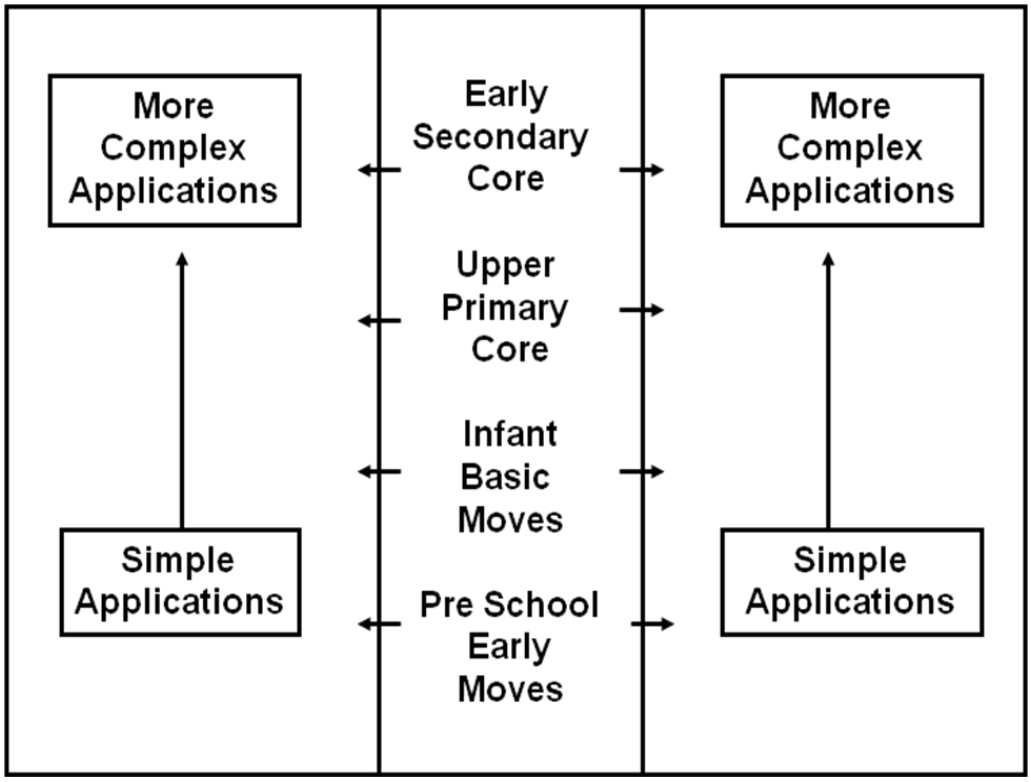

Figure 7.6 Developmental PE: The Vertical Progression from Simple to Complex

Early Years Core Learning

Early years core learning helps children develop the foundation that underpins their engagement in the physical activities across the lifespan and, as such, has a key integrating or connecting role for their learning in PE. While core physical learning is the main focus, children also need to develop the knowledge and understanding (cognitive) and the social and emotional skills that support their physical activity participation. As such, early years core learning focuses on children's basic movement foundation: the ability to consistently perform basic movements in a technically efficient, adaptable and creative manner so that they can perform the varied responses needed in different games, sports, dance and other applications

(Jess, Dewar & Fraser, 2004). The DPEG has created the Early Years Movement Framework to specifically focus on early years core learning. This framework consists of three related components (see Table 7.7): **the Balance and Coordination Grid** to help develop the movement foundation for preschool children; the **Basic Movements** that are the functional movements underpinning most physical activities and the **Movement Concepts** that are the cognitive, social and emotional elements that support children's movement adaptability and creativity.

Table 7.7 The Early Years Movement Framework

<table>
<tr><th colspan="2">Basic Movement Foundation</th><th rowspan="2">Made adaptable and creative by</th><th>Movement Concepts</th></tr>
<tr><td>• The Balance & Coordination Grid</td><td>• Travelling
• Object Control
• Balance</td><td>• Space
• Effort
• Relationships</td></tr>
</table>

a. The Balance & Coordination Grid

The Balance and Coordination Grid (Jess & MacIntyre, 2009) contains four underpinning movement elements: balance, coordination, postures and rotations (see Table 7.8).

Table 7.8 The Balance & Coordination Grid

Balance	**Coordination**
Two main types of balance • Static Balance/Still Body • Dynamic Balance/Moving Body	**The relationship between body sectors and body parts** • All sectors doing same • Sides or top/bottom only • One or more sectors in opposition • One or more sectors crossing the mid-line
Postures	**Rotations**
Main positions in which the body being held. • Upright posture • Mid posture • Lying posture	**Around different Axes of the Body** • Turn • Twist • Rock • Roll • Spin

As young children learn to move, these balance and coordination elements connect in many different combinations to create an almost infinite number of possible movement outcomes. Most of these combinations produce generic, non-specific movements that do not resemble traditional functional movements, e.g. moving across the floor (dynamic balance) in a low position (posture) with arms and legs working in opposition (coordination) with both legs twisting and turning (rotations). As such, these generic movements are very loosely bound and offer children the opportunity to explore the edge of chaos possibilities presented by their bodies.

However, a small number of grid combinations create the more functional, and more tightly bound, basic movements needed for successful participation in most physical activity contexts e.g. running, jumping or throwing. As such, the grid helps children develop a generic movement foundation through the regular exploration of the many balance and coordination possibilities of their bodies. Although the grid was developed a number of years after the original Basic Moves programme, it now forms the basis of the Preschool Early Moves programme (McIntyre & Logg, 2011) and is the key underpinning component of the 3-14 PE curriculum. In addition, the grid also helps teachers break down many of the basic and more specialised movements used by older children.

b. The Basic Movements

As just noted, basic movements emerge from specific balance and coordination combinations and are the functional movements children need to take part in different physical activities/applications. The three main categories of basic movement have been discussed earlier in the thesis: travelling, object control and balance (refer to Table 5.3) and will not be considered in any detail here. However, it is important to recognise that while basic movements were originally the basis of the stand-alone Basic Moves programme they are now more closely connected with the elements of the Early Years Balance and Coordination Grid and UPES core learning and applications.

c. The Movement Concepts

As also noted earlier, movement concepts are not actual movements but the cognitive, social and emotional factors that enhance the self organising capacity of the children by bringing adaptability and creativity to their movements. Specifically,

movement concepts are split into three categories to help children know where **(space),** how **(effort)** and who or what their body moves with **(relationships**) (refer to Table 5.4). As children develop their knowledge, understanding and use of movement concepts they become more comfortable to adapt their movements in different contexts e.g. moving fast or slow or changing from high to low when needed. In addition, children can also use the movement concepts to be creative by moving in ways that are unexpected or original. Without movement concepts, movements tend to be more rigid and tightly bound and lack the adaptability to respond to the demands of different contextual factors. Movement concepts are a particularly important feature of the Developmental PE vocabulary.

While much of the DPEG's original curriculum work focussed on the core elements of the Early Years Movement Framework (Atencio, Jess & Dewar, 2011), it is only recently that the group has been able to articulate how the framework supports the self-organising, emergent and ambiguous bounded nature of movement and offer children opportunities to explore the edge of chaos possibilities of their movements and connect with a range of more traditional physical activities/applications.

UPES Core Learning

Building on the Early Years Movement Framework, UPES core learning focuses on the psychomotor, cognitive, social and emotional skills that older, more sophisticated, children need in order to engage with the physical activities they are now meeting. Previously highlighted in Table 6.7 are some, but not all, of the core UPES knowledge, understanding and skills that older children need as they continue to develop their foundation for a range of more complex physical activity

experiences. However, while early years core learning has been successfully developed through the Early and Basic Moves programmes, the DPEG continues to grapple with the most effective way to deliver core learning experiences in the UPES years. In particular, the group has found that de-contextualised core learning experiences are considerably less interesting to older children although we have recently been able to report on successful efforts by PgCert teachers to connect UPES 'core' sessions with the applications discussed below (Jess, Atencio & Carse, in press).

Early Years and UPES Applications

In Developmental PE, applications act as the transitional mechanism between core learning and authentic lifewide participation. Applications help children progressively develop and apply core learning while also creating connections across and beyond the curriculum to real life contexts. Given the myriad of possible applications, the DPEG has been working to create a flexible applications framework that offers children a wider range of early years and UPES applications (see Table 7.9).

Table 7.9 Early Years & UPES Applications

Early Years Applications	Early Years Generic Applications Early Years Developmental Applications
UPES Applications	UPES Developmental Applications UPES Authentic Applications

Early Years Applications

Although the DPEG proposes early years PE should focus on children's basic movement foundation, it also recognises children need opportunities to apply or connect this core learning in appropriate contexts. Subsequently, early years applications have been split into two categories.

- **Early Years Generic Applications:** similar to the non-specific balance and coordination movements discussed earlier, generic applications help young children apply core learning in non-specific, loosely bound contexts. This type of application is particularly important for younger children because the more specific constraints or boundaries of games, gymnastics and dance activities are often developmentally too difficult for them. As such, generic opportunities to apply core elements from the Early Years Movement Framework are limitless and can include, for example, exploring different small and large apparatus lay-outs, responding to different music and percussion, playing with different objects, non-specific games involving basic movements e.g. tag/tig and many more. These generic applications are a critical part of children's PE learning as they not only extend the range of their core learning but also enable the children to explore more edge of chaos possibilities and take control to self-organise their own PE applied experiences.

- **Early Years Developmental Applications:** similar in time scale to multi-activity 'blocks' developmental applications focus on applying children's core learning in more recognisable bounded contexts. In the early years, these

developmental applications include games and athletics, dance, gymnastics, outdoor learning and aquatic applications and act as the foundation for the UPES developmental applications that follow.

Early years applications, therefore, are a central part of the Developmental PE curriculum and can either be included as part of Early Moves and Basic Moves core learning sessions or as stand-alone sessions specifically aimed at helping children apply their core learning.

UPES Applications

UPES applications not only fulfil a transitional role by consolidating, extending and applying core learning but also connect PE learning with wider curriculum and lifewide learning. Two related application categories have subsequently been proposed: developmental and authentic applications.

- **UPES Developmental Applications:** progressively build on early years developmental applications and focus on the development and application of children's core learning in more traditionally bounded physical activity contexts e.g. games, dance, gymnastics, aquatics, athletics and outdoors activities. Developmental applications, however, have been created to involve more participative learning experiences than usually seen in the narrower and more behaviourist-inclined 'block' approach. As such, these applications seek to engage the children in a more self-organising and emergent process (Jess et al, 2011), much in line with the Teaching Games for Understanding (Bunker & Thorpe, 1982), Educational Gymnastics (Long, 1982) and Movement Education

(Laban & Lawrence, 1947) approaches that have influenced PE developments in the past. In addition, UPES developmental applications have a specific transitional role in preparing children for the more authentic applications now discussed.

- **UPES Authentic Applications:** extend children's core learning and developmental applications by setting out to offer more 'real life' learning experiences. As such, authentic applications not only seek to develop the children's specific PE learning but also to connect with the broader school curriculum and the 'real life' contexts in which they participate beyond school. From a structural perspective, authentic applications need much more time than traditional 'blocks' and can last for as long as a term or semester as different learning connections are explored and developed. As discussed earlier in the thesis, authentic applications are closely related to the characteristics of Sport Education (Siedentop, 1994), and have been extended by the DPEG to include Dance Education (Irvine, 2009), Outdoor Journeys (Beames & Atencio, 2008) and, tentatively, Physical Activity Education which sets out to connect with lifelong physical activity dimensions (Penney & Jess, 2004).

By highlighting the need to apply core learning in authentic 'real life' contexts, this complex approach to Developmental PE specifically sets out to create more open-ended PE learning experiences for children that not only integrate across the physical domain but also create clear connections to wider school and 'real life' contexts. However, as will now be discussed, for this more connected and emergent approach

to impact on practice in schools teachers will need to shift from the more traditional narrow 'pedagogy of certainty' to a more open 'pedagogy of emergence' which recognises children as self-organising learners (Jess et al., 2011).

Complex Pedagogy

Connected to the Developmental PE curriculum, the DPEG has been creating ideas to put a more complex pedagogy into practice. The following section (adapted and extended from Jess, 2011) suggests a number of issues that will need to be addressed when engaging children in learning experiences based on the five principles discussed earlier. These eight ideas are by no means exhaustive and while the issues are only covered briefly, they give some idea as to how teachers can begin the process of shifting towards a more complex participative pedagogy.

1. **Begin with a Baseline Assessment**

An early baseline assessment helps teachers create programmes best suited to the children in their class. Teachers should find out about children's previous experiences in physical activity and sport and also assess their psychomotor, cognitive, social and emotional development in the PE context. There are many ways to plan this baseline assessment, but the DPEG has regularly engaged PgCert students in a detailed ecological baseline assessment as part of their early written assignments i.e. task, individual and environment (TIE) analysis.

2. **Identify Appropriate Learning Intentions and Activities**

The baseline assessment should help teachers (and children) identify appropriate learning intentions in line with the boundaries set by national guidelines. With a key aim of Developmental PE being to develop competent movers, critical thinkers,

collaborative and competitive learners and emotionally intelligent performers (Jess, 2011), learning intentions will not only be physical, but also cognitive, social and emotional. The planned learning experiences that support these learning intentions result in a range of different tasks for children including performing, demonstrating, copying, exploring, guiding, creating, problem solving, questioning, discussing, sharing, collaborating, competing, feeding back, using task sheets, peer tutoring, working in stations and reflecting. As such, a complex PE experience is more than simply a physical experience.

3. **Use Participative Pedagogy to Support Self-Organising Learning**

Teacher-led experiences should become less common as learning contexts are constructed to actively encourage children to create and self organise their own (and their peers') learning experiences. Emphasis should be on the sharing of learning intentions through the posing of problems, encouragement of dialogue and critique and the discovery of movement patterns over time. Further, learning contexts are created to support children's edge of chaos explorations so they come to view 'mistakes' as an important, necessary and even enjoyable part of the PE learning process.

4. **Use Assessment to Support Learning**

Teachers should constantly employ a range of assessment techniques such as observation, video analysis, questioning, quizzes, discussions, peer assessments, creative tasks and many others. As such, teachers not only track children's learning, but inform the learning process by feeding back to children and deciding next steps. Observing and analysing children's movement performance are usually the key to

supporting PE learning as they enable the teacher to assess progress, offer feedback and discuss different ways to address tasks. Assessment is an integral part of pedagogy and not something that is added on at the end of an activity 'block'.

5. **Learn to Modify the 'Shape' of Learning Tasks**

Teachers (and children) need to modify the 'shape' of their PE learning experiences by reducing or extending the complexity of the task. Limiting the range of possible responses in a technical task e.g. throwing in one 'set' way, will reduce the complexity of the task by setting narrow boundaries, while a throwing task requiring adaptability and/or creativity will need the teacher to extend the complexity of the task by offering a wider range of possible outcomes. In the main, technical tasks have a narrower, more specific focus, adaptable tasks a range of options and creative tasks are more exploratory and more open to interpretation (see Figure 7.7).

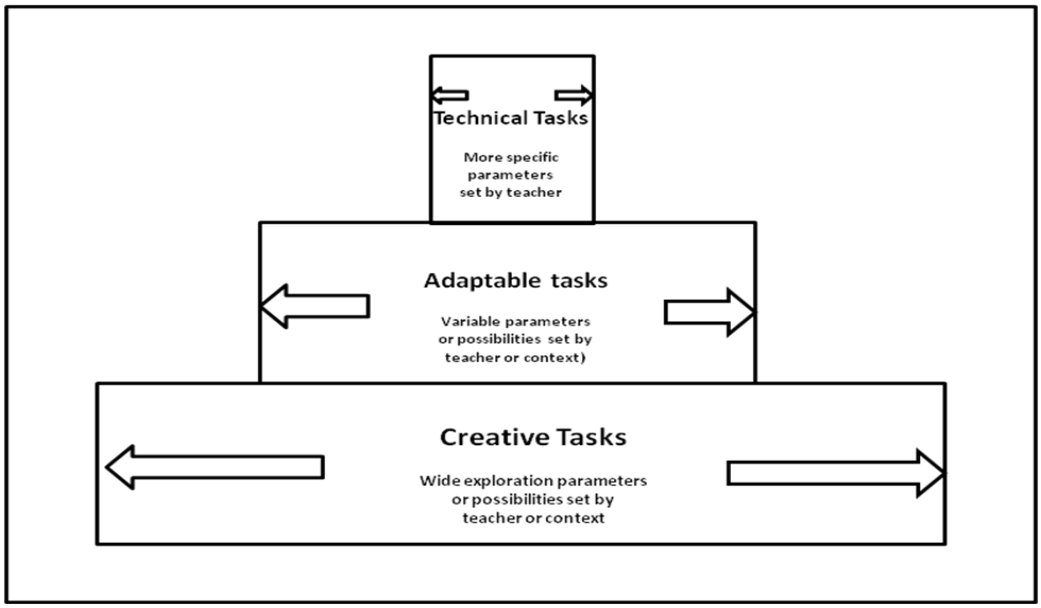

Figure 7.7 The 'Learning Space' for Creative, Adaptable & Technical Tasks

Helping children develop technical efficiency, adaptability and creativity in their movement responses will require the teachers (and children) to constantly modify the boundaries of the tasks being attempted.

6. **Structure Sessions to Maximise Practice**

While PE sessions are structured in many different ways, practice time requires close consideration. Basic Moves actively addresses this issue by introducing small group learning stations as a key component of sessions (Jess, 2004). By structuring learning stations to include intensive work with small groups, the teacher is able to check that learning had been consolidated or that the children are able to be extended. This approach has helped teachers track children's progress and enhances the likelihood of the children being presented with appropriate learning experiences. However, this is a complex task to organise and manage and requires detailed planning to ensure that, while the teacher works intensively with one group, all other groups are appropriately and safely engaged in self-organising practice tasks that require limited input by the teacher. From a safety perspective, teachers need to ensure that they are able to see all children when positioning themselves to work with the intensive group.

7. **Signpost Connections**

While some children recognise the connections between different PE activities, with other curriculum activities and with their life outside school, many do not. Teachers need to regularly help children identify connections through a range of direct and indirect pedagogy techniques e.g. group discussions or integrated tasks. As noted earlier, it is critical that teachers and children are able to appreciate the connections

that PE has within itself, across the school curriculum and in their 'real life' scenarios.

8. **Reflection**

Finally, reflection is a constant of Developmental PE. Identifying the positive and negative aspects of the PE experience is essential for the on-going development of many aspects of a programme: planning, delivery, assessment, children's engagement, contextual issues, teacher knowledge etc. This reflective process feeds back into the programme so that changes – sometimes major changes – can be made to enhance the learning process. Without reflection teachers are more likely to return to a more narrow and controlling pedagogy.

Therefore, as the DPEG's complexity agenda moves forward these suggestions will move teachers towards a self-organising, ambiguously bounded and more open 'pedagogy of emergence' which recognises the need to connect children's PE learning with broader educational and lifewide agendas.. As such, self-organising and emergence principles become a key feature of the delivery of this developmental PE curriculum.

Complex Professional Learning

Following the limited engagement with professional learning during the foundation phase and the ill-informed efforts during the early part of the Delivery Phase, the DPEG's more recent professional learning activities have increasingly been informed by contemporary thinking from the professional learning and complexity-oriented literature. The group now seeks to develop a professional learning approach that is

not only active, reflective, on-going and collaborative but also self-organising, situated, supported and emergent. This more principled and informed approach has been made possible by the long term nature of the PgCert in 3-14 PE which enables the DPEG to work with teachers as self-organising professional learners whose development follows different trajectories in different contexts. Consequently, during the current phase of the SPPEP, the PgCert programme is being restructured in line with complex ecological principles and components. This new programme not only employs a more participative and complex pedagogical approach to its delivery but also focuses on teachers' engagement with complex curriculum and pedagogy and the roles they play within their situated learning communities. In conjunction with colleagues from Glasgow University, the DPEG are now working to create an infrastructure that will support the ongoing dissemination and development of a more complex approach to PE within local learning communities. From a DPEG perspective, this emerging infrastructure includes a number of related features. Core learning and application tutor training courses have been developed and delivered to over 100 teachers. While the number of courses delivered by these tutors in their local areas remains few they represent a key component of the future dissemination of the curriculum ideas. At the local level, we are conscious of the need to focus on the development of contexts which support teachers, head teachers and other staff to develop primary PE learning communities. To help create local primary PE learning communities we are investigating the possibility of developing strong hub partnerships much in line with those suggested by the Donaldson Review (Donaldson, 2010). However, the development of robust local primary PE learning communities needs to be supported by a flexible national network. Connections and

collaborations between teachers and other professionals, universities, schools, clusters, local authorities and national agencies are critical if the SPPEP national framework is to build on its current platform and deliver to its full potential. Encouragingly, the Scottish Government has supported a series of regional network seminars, a national summer school and a national primary PE conference to 'kick start' the introduction and development of national and local networks during 2012. Finally, the project team has also proposed the development of a new curriculum leadership programme for PgCert teachers that aims to help the teachers sustain the development of local and national primary PE networks. This notion of distributed leadership connects with the current thinking of the Scottish Government (Donaldson, 2010) and has been supported, informally, in discussion with the General Teaching Council for Scotland (GTCS). While most of these professional learning developments are in their early stages they highlight how the DPEG is not only engaging with complex curriculum and pedagogy, but seeking to create a connected infrastructure that acknowledges and supports the self organising, non-linear and ambiguously bounded nature of PE developments within local learning communities.

Section Conclusion

This final section has highlighted how the DPEG has increasingly made use of key components from the CEA to take significant steps towards the creation of a curriculum, pedagogy and professional learning approach informed by complexity-oriented principles. In particular, this approach highlights how, from the starting point of a detailed ecological assessment, the integrated nature of the complexity tenets of self-organisation, emergence, ambiguous bounding, edge of chaos,

connectedness and nestedeness all play a significant role in shaping this innovative approach to developmental PE.

7.6 Chapter Conclusion

By considering the three main questions posed earlier in the thesis, this chapter has explored the extent to which the evidence from my personal DPEP narrative offers support for a CEA to curriculum innovation. Two broad issues have been discussed: the extent to which contextual factors and my personal capacities have influenced my innovation efforts and, further, the extent to which these innovation efforts could be described as complex. In the main, the evidence presented offers encouragement. There seems to be strong support for the notion that contextual factors and personal capacities have a significant influence on the innovation process. However, this may not be particularly surprising given that ecological and 'change knowledge' factors have already received considerable attention in the education literature, although they may not have been conceptualised or discussed in this way. Further, while the data supports the complex nature of the innovation process it also supports the complexity of the actual innovations themselves. This final point is particularly noticeable in my, and the DPEG's, more recent curriculum, pedagogy and professional learning efforts which have increasingly been informed by complexity-oriented theories (Jess, 2011; Jess et al, in press). As such, with some exploratory evidence supporting the complexity of the innovation process and the nature of actual innovations, the final chapter will conclude the thesis by presenting recommendations for the role of the CEA in future curriculum innovation agendas.

Chapter 8: Reflections and Recommendations

8.1 Introduction

The focus of this thesis has been change and innovation. Specifically, the thesis has introduced and explored the possibilities of a CEA that, it is proposed, will help teachers build the capacity to cope with and influence curriculum innovation. Subsequently, to bring the thesis to a conclusion, this final chapter presents a reflective overview of the thesis in order to foreground three key recommendations for the future development of the CEA.

8.2 The Thesis: It's Nature, Evidence and Claims

The main thrust of this thesis has been the concurrent development and exploration of the possibilities of a CEA to curriculum innovation: an approach, it has been proposed, that has some potential to more actively engage teachers in the curriculum innovation process. Consequently, the thesis has not been presented in a traditional manner and, before recommendations for future development of the CEA are considered, a number of issues about the nature of the thesis will be addressed i.e. the intended audience, the CEA development process and the nature of the evidence presented and the claims made.

Audience and Process

As discussed at the start of the thesis, the long term focus of educational change on top-down or tri-level development (Barber & Fullan, 2005) is considered problematic as it usually treats teachers as recipients of, and not active participants in, the change process. It is important to reiterate that while the thesis has largely focused on the

possibilities of the CEA for teachers, the CEA has not only been developed for teachers but for educators across all levels of the education system. Therefore, the nested nature of the CEA highlights how this approach is also relevant to those who have traditionally guided or led the educational change process e.g. head teachers, lecturers, local authority management and government officials.

Further, the development of CEA has itself been a complex process that will hopefully continue after this thesis has been completed. Presented as a re-working of key components from Fullan's 'change knowledge' and concepts from a number of complexity-oriented theories, the iterative process of drafting, writing, redrafting and rewriting drafts of the CEA has not been without its difficulties. In particular, the paucity of examples in which complex concepts have been applied in practice (Cilliers, 2010) and the embryonic nature of the conceptually connected capacities, has resulted in this redrafting process being particularly 'messy' and, at times, frustrating. As such, it is not the intention to suggest that the CEA is a 'finished product', although key concepts and components may be in place, but that it is a 'work in progress' that requires much further work and research to further conceptualise and extend the CEA to a wider audience.

The Nature of the Evidence

Because of the complex development process of the CEA, it is important to highlight that the evidence presented in the thesis is of an exploratory nature and, as such, it is not the intention to prove or evaluate its efficacy in a causal sense. The goal is to create a broader contextual justification for the CEA and to present insights that may be of value to the education profession (Cortazzi, 1993). In line with the nascent

state of the CEA, it was decided that the more traditional approach of setting up intervention studies to collect supporting evidence was premature and that my personal narrative over a 24 year period would be used in an initial attempt to explore the potential of the CEA and create a persuasive and inductive case. I am conscious, however, that by taking this approach the evidence generated is based on my personal retrospective meanings of events and that there is little objective data to corroborate these meanings. As such, in my efforts to create a balanced and logical case to support the components of the CEA, the evidence presented is not only based on my personal perceptions of the data but also from contextualising government, government agency and academic texts and my personal professional and peer-refereed academic papers published over the last decade. In addition, the thesis has not set out to present the DPEP as a success story but as an exploratory journey made up from a series of positive and negative events. Consequently, the thesis has used a self-study approach to construct a case for the CEA based on personal recollections that set out to be plausible, ring true and enable connection (Bullough & Pinnegar, 2001). As was noted in Chapter 3, it has been my intention, to create a narrative *'of which one might say 'I can see that happening'* (Connelly & Clandinin, 1990, p. 8).

Therefore, with the main thrust of this thesis being the concurrent development and personal exploration of a CEA to curriculum innovation, it is important to stress that, in this first instance, the goal has been to present a narrative that is believable, logical and insightful.

The Claims

Reflecting on the evidence presented throughout the thesis there appears to be some support for the idea that both the innovation process and the actual innovations themselves are complex phenomena.

The Innovation Process

From the perspective of the innovation process, the evolving and ever-changing nature of contextual factors and personal capacities would seem, interactively, to influence the non-linear trajectory and emergent nature of innovation efforts (see Figure 7.3). From a contextual perspective, while the DPEP exploration was largely focussed on the impact of nested environmental factors on my innovation efforts, a number of ecological themes have emerged. Over the years of the project, the different and changing macro, meso and micro contexts in which I worked all had an influence on my personal capacities and the nature of my innovation efforts. For example, the different macro political contexts in neo-liberal England and more egalitarian Scotland had a significantly different impact on the focus and direction of my innovation ideas. At a personal level, the extent to which my vision has been compatible (Scotland) or incompatible (England) with the macro context has had a significant impact on my nature of my innovation efforts. While my curriculum innovation agenda gradually eroded in England and ultimately resulted in a significant shift in focus and direction i.e. to psychology as opposed to curriculum and pedagogy, in Scotland, I was more motivated and more able to pursue a broader and ultimately more complex curriculum, pedagogy and professional learning agenda. However, from an ecological task perspective, the continued dominance of

the traditional 'block' approach to PE in both countries has resulted in some relationships at the micro and meso levels being tense, particularly with primary PE specialists and local authority managers who have built up an 'indigenous mastery' over many years. As a consequence, the dissemination of my innovation efforts in these situations has often stalled or stopped completely. However, with macro level developments in early years PE in both countries now moving in a more generic and developmental direction, it may be realistic to propose that my complex developmental agenda may gradually become more accepted across a wider range of the nested system. Therefore, from a complexity perspective, my DPEP narrative has shown how different and changing contextual factors have not only set ambiguous boundaries for my innovation efforts, but boundaries that have impacted upon the exploratory nature of my self-organising innovation efforts.

From this self-organising perspective, my long term narrative also highlights how my personal capacities have evolved over the period of the DPEP. Because complex capacities are a different way of looking at 'change knowledge' it is perhaps not surprising that the evidence presented in the DPEP chapters not only supports their existence but also their importance in the innovation process. Personal vision, inquiry, reflection and emotions have all been cited in the literature for decades (e.g. Schon, 1987; Fullan, 1991) and, as such, the issue in this thesis is less about their existence and more about the extent to which the CEA offers a more connected conceptualisation of the 'change knowledge' factors that can help teachers and other professionals develop the self-organising capacities to cope with and influence the innovation process. For example, my personal narrative presents an evolving picture of a personal vision that has not only been informed by more process-oriented

inquiry, reflection and emotional capacities, but which has also helped me create a knowledge base and, later, the relationships that connect the different components of my innovation agenda. As was discussed on a number of occasions, my innovation efforts have generally become more successful when my knowledge base and relationships are more related to my vision and connected within, across and beyond the PE context. As such, from a complexity perspective, my capacities could be described as the self-organising tools that have enabled me to construct my innovation efforts in a manner that has become more adaptable, creative, non-linear and connected over time. This is particularly apparent over the last few years as the DPEG has built the capacity to work towards a collective vision that has not only seen the emergence of complex curriculum, pedagogy and professional learning ideas but has also led to a wider range of collaborative relationships within, across and beyond the immediate context.

Therefore, within the ambiguous boundaries set by the different contexts in which I have worked, my evolving personal capacities have consistently given my innovation efforts a focus and direction and helped create the connections within and beyond the immediate environment. As such, it is within these bounded contexts that my self-organising explorations have not only resulted in a range of positive connections across the nested levels of the education system, but have also led to numerous disconnections, mistakes and significant 'bifurcations' (Prirogine, 1997).

However, while this evidence offers some encouragement about the impact of contexts and capacities on complex nature of the innovation process, there is now a need for more work and research to be carried out to ascertain the effectiveness of

these conceptualisations to effectively support teachers' innovation ideas in terms of focus, direction and connectedness.

Innovations

While evidence underlining the complex nature of the innovation process pervades most of my DPEP narrative, evidence in support of the complexity of my specific innovation efforts is more recent. In part, this is because there are few published examples of complex innovations, particularly in PE, and also because the process of reconceptualising the DPEG's innovation efforts from a complexity perspective has been a gradual process evolving concurrently alongside the development of the CEA. However, as was discussed at the end of chapter 7, the DPEG's most recent innovation efforts are more closely linked to complexity principles and, as such, offer examples of the transition that has been taken towards curriculum, pedagogy and professional learning innovations that could be described as complex (Jess et al, 2011; Jess et al, in press). The following examples highlight how these recent innovation efforts are more conceptually integrated within complexity principles.

From a curriculum and pedagogy perspective, the following three examples highlight this change towards complexity. First, a recurring DPEP issue has been the inability to present a conceptually integrated explanation of the apparent polar opposite notions of certainty and uncertainty within Basic Moves. In particular, this problem was highlighted as the DPEG grappled with 'gold standard' fixed criteria for 'mature' basic movements and the uncertainty of adaptability and creativity as enacted through the movement concepts. However, as our understanding of self organisation, emergence and non-linearity evolved we have moved away from set

criteria for all performers to the idea of 'best fit' movement responses by different children in different contexts. 'Best fit', however, does not mean 'anything goes' but acknowledges that movement behaviour will be constrained by the ambiguous boundaries created by children's capacities and the key contextual factors. In this sense, complexity acknowledges that children will self organise as best they are able within contexts that are ambiguously bounded i.e. the learning space. Critically, by manipulating task boundaries to either reduce or extend the complexity of the 'learning space', teachers can accommodate notions of technical, adaptable and creative within the same frame of reference. For example, limiting the range of possible responses in a task reduces the complexity of the task and sets narrow boundaries that are more likely to encourage more technically focussed responses. As Biesta (2010) has pointed out, however, reducing the complexity of the task will not lead to certainty but outcomes that are more probabilistic. Conversely, tasks requiring more adaptability and/or creativity require the teacher to extend the task complexity by offering a wider range of possible outcomes. As such, more technical tasks have a narrower focus, adaptable tasks a range of options and creative tasks are more exploratory and more open to interpretation (see Figure 7.9). Consequently, technical, adaptable and creative responses are no longer perceived as polar opposites but have been 'harmonised' (Davis & Sumara, 2010) within a complexity framework.

In a similar vein, with Basic Moves originally a reaction to the traditional multi-activity approach, early reference was made to children applying their basic movements in 'increasingly more complex contexts' (Jess, 2004). However, in these early days, it was unclear what these 'more complex contexts' or 'applications'

would be and, as has been discussed, the DPEG curriculum developments stalled for a period of time. Also, although the rhetoric of connectivity was apparent in our writing (Jess, Pickup & Haydn-Davis, 2007), it has taken some time for these connections to percolate into practice. Using self organisation, ambiguous bounding and edge of chaos as the basis, the group's recent curriculum and pedagogy efforts now clearly articulate the connection between core learning, more traditional applications and more contemporary applications. With core learning the key facilitator of self-organisation, the group has now highlighted how the different boundaries set by the rules, tactics, equipment, facilities and other factors create the different 'complex contexts' in which children can apply their core learning. As such, the DPEG is now able to use notions of connectivity, ambiguous bounding and edge of chaos experimentation to explain the possibilities of traditional e.g. games, gymnastics and dance, and more contemporary applications e.g. sport education, teaching games for understanding, aqua moves and outdoor journeys. Basic Moves is no longer cut off from the rest of the curriculum but, through our engagement with complexity, now connects with other elements of core learning (Jess & McIntyre, 2009; Thorburn et al, 2009), with a range of PE applications and increasingly with elements of interdisciplinary learning, authentic, 'real life' learning and, in a nested manner, with Scottish national guidance (Scottish Government, 2009)

Therefore, although these explanations of complex curriculum and pedagogy have been more recent, the evidence presented towards the end of this thesis would suggest that complexity principles are now helping the DPEG negotiate the more divisive issues that stalled the earlier DPEP developments. In particular, by explaining core learning and applications from a complexity perspective, the DPEG

is moving its curriculum and pedagogy innovation agenda in, what appears to be, a more logical and connected direction.

Finally, from a professional learning perspective, the DPEG is also developing a more complexity-informed innovatory approach. While much of the initial ill-informed professional learning work tended towards a more top-down, 'fill the empty vessel' approach, engagement with contemporary professional learning and CEA ideas is gradually permeating our efforts. While the group now actively acknowledges the self-organising and emergent nature of the professional learning process it is increasingly working to help teachers develop distributed or curriculum leadership roles and to situate their professional learning in their schools and local communities. As a consequence, this work is being focussed on the creation of more open-ended professional learning communities and networks that help develop and sustain connections within and across the profession. However, as with the curriculum and pedagogy efforts, this complex approach is developing slowly and, while these ideas are being clearly articulated in recent proposals to government and other funding agencies, the management of this approach will probably require an extended timeline.

As such, the evidence from the thesis highlights how earlier DPEP innovations were inconsistently informed and failed to cope with notions of certainty and uncertainty from different theoretical lenses. However, as has just been discussed, the more recent DPEP innovations are increasingly being informed by complexity principles and incorporate notions of self-organisation and emergence, ambiguous boundaries and edge of chaos opportunities, and connectedness and nestedness.

Section Conclusion

This reflexive overview has revealed a number of points about the current status of the CEA. On a positive note, the evidence presented appears to offer support for the idea that educational innovations and the processes by which these innovations are developed and disseminated can be described as complex. In particular, there appears to be strong support for the notion that the innovation process is influenced by an individual's personal capacities and the context in which they are operating. However, while innovations themselves may be complex, there is an acknowledgement that the development of complex curriculum, pedagogy and professional learning innovations is a relatively new phenomenon and will require considerably more development and research if teachers and other professionals will be able to effectively engage with curriculum innovation in this way. As such, as the evidence from the thesis is based on my personal retrospective narrative, future projects and studies will need to be more objective and varied. In addition, if the CEA is to develop beyond the parameters of one curriculum area and classroom teachers, it is critical that future developments involve a wider range of curriculum areas and educators from across the nested education system. To conclude, the evidence from this thesis would suggest that this new approach to the curriculum innovation process has some potential for future innovation agendas but, given its infancy, will require considerable development and research to build on the encouraging evidence from this thesis.

8.3 Recommendations

On the basis of the points raised throughout the previous chapters, the thesis will conclude by making three recommendations for the future. However, as noted earlier, while the thesis has primarily focused on the possibilities of the CEA for teachers, these recommendations acknowledge the nested nature of the CEA and, as such, their intended audience are educators across all levels of the education system.

Recommendation 1: Consolidate and extend the development, delivery, research and publishing of complex developmental PE Curriculum

At the micro level, it is suggested that the DPEG seek to consolidate and extend its thinking on complex developmental PE curriculum by creating a Developmental PE Research Centre (DPERC) at the University of Edinburgh. Building on a similar rationale to the CMC during the 1990s at MMU, the DPERC should set out to work with children and focus on the ongoing development, delivery and research of the developmental PE curriculum. Critically, this recommendation will help the DPEG, at first hand, negotiate, explore, apply and evaluate many of the complexity-oriented ideas it has been developing and writing about over the last few years. In addition, as will be discussed in the next two recommendations, the DPERC will also help create a focal point from which many complex innovation ideas can be disseminated by way of the DPEG's primary PE professional learning activities and, more gradually, across the nested levels of education system.

Recommendation 2: Consolidate and extend the development, delivery, research and publishing of complex professional learning approach to primary PE

In the future, it is recommended that efforts are made to disseminate the DPEG's complex developmental PE curriculum and pedagogy ideas across the nested levels of the system through the on-going development of the CEA's context and capacity components. It is suggested that these professional learning activities include a DPERC professional learning programme and the PE undergraduate and postgraduate programmes at the University of Edinburgh, SPPEP professional learning activities and the more recent Early Years PE project which the DPEG are undertaking in partnership with Glasgow University, the Youth Sport Trust (YST) and BUPA, a large British healthcare organisation. The focus of these complex professional learning activities should herald a move away from an emphasis on traditional, top-down CPD courses to more self-organising, participative, situated and ongoing practices that seek to help teachers not only develop the capacities to engage with curriculum innovation but also create effective primary PE professional learning communities and networks. A key feature of this recommendation should be the creation of a long term professional learning research programme to track the impact of these complexity-oriented activities on the development of primary PE across the country.

Recommendation 3: Extend the focus of CEA developments across the nested levels of the education system

Given the nested nature of the CEA, it is finally recommended that, in the medium to long term, strategic efforts are made to extend the focus of CEA developments beyond the current emphasis on primary PE and teachers. It is recommended that consideration be given to the nature of the future professional learning activities, the professional and academic publications, collaborative relationships and research projects that would effectively help disseminate the CEA across the wider nested levels of the education system.

8.4 Conclusion

Educational change, in curriculum innovation terms, is complex. It is not a top-down linear process and, equally, it is not only a bottom-up self organising emergent process. However, it has, for too long, been delivered in a top-down manner and it is proposed that future educational agendas should involve a more balanced approach. As such, governments, national agencies and the education profession will need to work more collaboratively in future to develop shared innovation projects. However, given teachers' current starting point, it is critical in the short term that all levels of the education profession, with some urgency, begin to work together to help teachers (and others) build those capacities that will help them make a positive contribution to future curriculum innovation agendas.

In line with these issues, this thesis has presented one approach, the CEA, which views innovation and change through a complexity lens. Although the CEA is in its embryonic phase of development this thesis has presented initial evidence, from my personal curriculum, pedagogy and professional learning innovation efforts, that suggests this approach may have some potential for the future. In particular, it would suggest that the complex nature of the innovation process, and the creation of innovations themselves, may be better supported by helping educators, and teachers in particular, develop the knowledge and skills needed to apply complexity principles in practice. To do this, teachers and others will need to develop a better understanding of the ecological contexts in which they work and, over time, develop the directional and integrating capacities that will give these efforts focus, direction and connectedness. As such, this thesis has presented the case that the CEA may have some potential to help teachers and others build the capacity to make an important collective contribution to future curriculum innovation agendas.

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